

Appendix M

Detailed Economic Analysis

APPENDIX M DETAILED ECONOMIC ANALYSIS

The purpose of this appendix is to provide information on the economic impact that would occur if the Service were able to authorize incidental take. In particular, this appendix presents the detailed economic analysis of the baseline conditions, Alternative 2 (authorization of incidental take in USJ and NW Stocks), and Alternative 3 (authorization of incidental take in USJ, NW, and Atlantic Stocks). These analyses differ from those presented in the DEIS because they reflect the following:

- A revised baseline to clarify the fact that permitting restrictions are already in existence and are not attributable to the proposed rule;
- Revisions made to respond to public comments on the DEIS; and,
- Revisions made to incorporate updated permitting information for fourth quarter 2002 and permit approval rates.

In order to understand the costs and benefits that would be associated with Alternatives 2 and 3, it is important to understand that economic impact analysis involves the comparison of expected costs and benefits for each alternative against a “baseline.” The baseline typically reflects the regulatory requirements in existence prior to undertaking the alternative. The baseline being considered for this analysis assumes that the Service takes no additional regulatory actions to protect the manatee. In fact, manatee conservation efforts are already in existence, and currently impose costs on various public and private parties. For example, permitting of watercraft access facilities is currently being affected due to consultations under section 7 of the Endangered Species Act (ESA) and the settlement agreements related to the Save the Manatee Club litigation. To the extent that an alternative would allow additional permitting, this would result in a benefit.

The economic analysis focuses on those activities potentially affected by the proposed alternatives, and thus likely to result in incremental economic impacts. In order to measure the incremental impact of Alternatives 2 and 3, the analysis considers the existing economic impacts of manatee conservation efforts for activities that would change under any of the alternatives. For example, because both Alternatives 2 and 3 would change the level of administrative requirements related to manatee conservation, the analysis considers the existing costs related to administrative efforts. Conversely, the analysis does not consider the existing economic impacts for activities having costs that are not expected to change under any of the alternatives. For example, the costs of activities related to regulating boater behavior on the water, including vessel registration, are not quantified.

The economic analyses of the alternatives compares the expected economic impacts under each alternative to the economic impacts occurring under baseline conditions to determine the incremental costs and benefits attributable to each alternative. This Appendix presents three economic analyses. Section I presents a discussion of baseline economic conditions. Section II

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discusses the incremental economic impacts expected under Alternative 2 (authorization of incidental take in USJ and NW Stocks). Section III presents the incremental impacts of Alternative 3 (authorization of incidental take in USJ, NW, and Atlantic Stocks).

I. ECONOMIC ANALYSIS OF BASELINE CONDITIONS

Introduction

The purpose of this section is to provide information about the impacts that would be expected during the five-year period of the rule under baseline conditions. The baseline conditions discussed here are only those that are relevant for analyzing the alternatives; specifically, we focus on existing manatee conservation efforts that would change under any of the alternatives. In particular, because administrative activities and permitting restrictions could change under the alternatives, the discussion of baseline economic impacts includes the following:

- *Administrative Costs*: This category represents existing costs associated with current manatee conservation efforts. These costs are related to the following activities: development and enforcement of manatee protection areas, agency administrative efforts, education and outreach, permitting efforts, and additional manatee conservation efforts.
- *Consumer Surplus Effects*:¹ Based on current permitting restrictions on multi-slip watercraft access facilities, the analysis considers baseline economic effects associated with decreased recreational boating opportunities resulting from limited access to the water.
- *Regional Economic Impacts*:² Because existing permitting restrictions limit construction of additional marine access facilities, the analysis estimates secondary effects on the Florida economy that would result from decreased expenditures in the marine industry. First, limits on building additional marine access points are likely to limit growth in recreational boating activity. This decrease in boating activity is likely to lead to decreased demand for marine retail sales, such as boats, clothing,

¹Surplus is generally a measure of overall economic welfare and is conceptually based on the principle that some consumers benefit at current prices because they are able to purchase goods and services at a price that is less than their total willingness to pay for the good. For example, boaters may incur consumer surplus losses because they have to travel further to find an uncongested boat ramp.

²Regional economic impact estimates are independent from surplus effect estimates and cannot be added to obtain a single value.

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general marine merchandise, and other related goods and services. Second, restrictions on the authorization and construction of facilities such as marinas and boat ramps are likely to impact demand for marine construction services.

Summary of Impacts

Economic impacts expected under baseline conditions are summarized below and in Exhibit M-1.

Administrative Costs

- **Development and Enforcement of Manatee Protection Areas.** Under baseline conditions, developing and enforcing manatee protection areas would be expected to cost agencies over \$18 million during the next five years. In addition, recreational boaters may experience some negative impacts associated with having to comply with speed zones, while waterfront property owners may accrue positive impacts associated with adjacent speed zones.
- **Agency Administrative Efforts.** Agency administrative activities (including monitoring, reporting, and research related to manatee recovery) are expected to cost approximately \$15 million over the next five years under baseline conditions.
- **Education and Outreach.** Under baseline conditions, education and outreach efforts related to manatee recovery are expected to cost approximately \$3 million over the next five years.
- **Permitting Efforts.** Permitting efforts related to the manatee are expected to cost approximately \$3 million for the Service and \$1 million for FWC over the next five years under baseline conditions. No cost estimates are available for Corps, DEP, USCG, and WMD activities.
- **Additional Manatee Conservation Efforts.** Under baseline conditions, additional recovery efforts are expected to total approximately \$11 million over the next five years.

In total, administrative costs related to manatee conservation efforts under baseline conditions would be expected be approximately \$52 million over the five-year period of the rule.

Consumer Surplus Effects

- **Marina Users.** Due to restrictions on new marina construction, the commercial marina industry would be unable to meet projected demand in some areas under baseline conditions. As a result, some boaters would incur surplus losses associated with limited access. This loss would be approximately \$5 to \$6 million over the five-year period.
- **Boat Ramp Users.** Due to an expected reduction in new ramp construction under baseline conditions, demand for ramp access would likely exceed supply in the next five years. As a result, some boaters would incur surplus losses associated with limited access. This loss may range from no effect to approximately \$56 million over the five-year period.

Total consumer surplus losses for both marina users and boat ramp users under baseline conditions would be expected to be \$5 to \$62 million over the five-year period.

Regional Economic Impacts

In addition to the surplus effects to recreational boaters, under baseline conditions, income and employment in various sectors of the marine industry and marine construction industry would be affected. Impacts to these sectors would, in turn, result in indirect effects on the broader economy.

- **Marine Goods & Services.** Restrictions on the authorization and construction of watercraft access facilities would continue to impact the growth of recreational boating activity under baseline conditions. Currently, growth in demand for goods and services related to marine recreation is affected due to these existing restrictions. We estimate that, in year-five of the rule, the direct impact would be between \$3 and \$30 million in the sales of marine related goods and services, and that this initial reduction in expenditures would lead to a negative regional economic impact of between \$4 and \$48 million in year-five under baseline conditions.
- **Marine Construction Industry.** Restrictions on the authorization and construction of watercraft access facilities under baseline conditions would also impact revenues of the marine construction industry. We estimate that, in year-five of the rule, there would be an initial impact of less than \$1 million on this sector, resulting in a negative regional economic impact of approximately \$2 million under baseline conditions. The annual impact for this category is expected to be constant over the five-year period of the rule, thus annual impacts also represent year-five impacts.

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Thus, current permitting restrictions would lead to a negative regional economic impact of between \$4 million and \$48 million due to a decrease in the revenues of the marine recreation industry and \$2 million due to a decrease in the revenue of the marine construction industry. Thus, in year-five of the rule, a total negative regional economic impact of between \$6 million and \$50 million is expected under baseline conditions.

EXHIBIT M-1 Summary of Economic Impacts Under Baseline Conditions (millions of 2001 dollars)					
	NW	USJ	Atlantic	Southwest	Total ^a
<i>Administrative Costs^b</i> <i>(Five Year Total)</i>	n/a				\$52.2
<i>Consumer Surplus Losses</i> <i>(Present Value Total)</i>					
Marina Users	\$0	\$0	\$0.6 - \$0.7	\$4.6 - \$5.2	\$5.2 - \$6.0
Boat Ramp Users	\$0	\$0	\$0 - \$17.6	\$0 - 38.6	\$0 - \$56.2
Subtotal	\$0	\$0	\$0.6 - \$18.3	\$4.6 - 43.8	\$5.2 - \$62.2
<i>Negative Regional Economic Impacts^c</i> <i>(Year-Five Totals)</i>					
Marine Goods & Services	\$0	\$0	\$0.7 - \$16.7	\$3.7 - \$31.2	\$4.4 - \$47.8
Marine Construction	\$0	\$0	\$0.3	\$1.6	\$1.8
Subtotal	\$0	\$0	\$0.9 - \$16.9	\$5.3 - \$32.8	\$6.2 - \$49.7
^a Totals may not add due to rounding. ^b Sufficient data do not exist to allow administrative costs to be reported by region. ^c Regional economic impact estimates are independent from surplus estimates and cannot be added to obtain a single value.					

Additional breakdown of the economic impacts under baseline conditions is provided in Appendix L, which provides a year-by-year summary of nominal impacts by category and stock for the five-year period of the rule.

Limitations of Analysis of Baseline Conditions

It is important to note that there are limitations associated with this analysis of baseline conditions. These limitations are discussed below and summarized in Exhibit M-2. There are a number of factors that may lead us to under- or overestimate economic impacts. In particular, we may understate economic impacts based on the following assumptions.

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- The analysis does not account for growth in out-of-state boaters using Florida waters. These new boaters may be affected by this rulemaking; however, given the limited data available on these boaters, they could not be included in the analysis.
- Historical permitting rates are assumed to continue into the future. Given the growth in Florida, this assumption may lead us to understate economic impacts resulting from existing permit denial rates.

In addition, we may overstate baseline economic impacts based on the following assumptions.

- The analysis assumes that there is an unmet demand for watercraft access facilities because of capacity constraints under baseline conditions. In some cases, there may be available capacity; if this is the case, this assumption will lead us to overstate economic impacts. In addition, we assume that demand cannot be met outside of the region. Our analysis does not allow for the fact that marinas and boat ramps are geographically located in areas that may not coincide with demand. These assumptions may lead us to overstate economic impacts.
- The IMPLAN model that is used to estimate regional economic impacts is a static model and does not account for the fact that the economy will adjust. IMPLAN measures the effects of a specific policy change at one point in time. Over the long-run, the economic impacts predicted by the model may be overstated as adjustments occur.
- The analysis assumes that there are no available substitutes. For example, in the case of boat ramp users, we assume that if boat ramps are too congested, some boaters stop boating. In reality there may be other available substitutes such as borrowing a neighbor's vacant dock or mooring. Our assumption of no available substitutes may lead us to overstate economic impacts.

Certain assumptions may affect our estimate of economic impact; however, we have no way to determine the direction of impact due to the following assumptions.

- The analysis assumes boaters will not go boating under various scenarios. However, there is no model available to estimate boaters' response to a change in supply of watercraft access facilities.
- The analysis utilizes data from various previous studies. Given the timing required for completion of this analysis, we were unable to collect primary data on which to base the analysis. Without current data collection for comparison, it is difficult to estimate whether our analysis may be over- or understated because of potential biases in our secondary data sources.
- The IMPLAN model that is used to estimate regional economic impacts relies on 1998 data. If significant changes have occurred in the structure of Florida's economy, our results may be sensitive to this assumption. The direction of any such bias is unknown.

EXHIBIT M-2 SUMMARY OF FACTORS AFFECTING BASELINE ADMINISTRATIVE COSTS			
Category	Description of Category	Uncertainty or Other Factor Affecting Accuracy of the Baseline Economic Impact Estimate	Direction of Potential Bias
<i>Administrative Costs</i>			
Development and Enforcement of MPAs	Costs associated with developing and enforcing manatee protection areas, including speed zone compliance.	Overall economic impact that development and enforcement of speed zones has had on boaters is not quantifiable.	Underestimate
		Economic benefit that waterfront property owners accrue due to slower speed zones and reductions in boat wake are not quantifiable.	Overestimate
Agency Administrative Efforts	Costs associated with a variety of activities including population and mortality monitoring, habitat research, development of county level manatee protection plans.	Additional administrative efforts of coordinating the Working Group on Watercraft-related Incidental Take (WGWIT) not quantifiable.	Underestimate
		New monitoring, reporting or research efforts WGWIT may recommend over the five-year period of the rule not quantifiable.	Underestimate
Education and Outreach	Costs to agencies of developing materials, coordination of outreach efforts, and informing stakeholders about manatee protections efforts.	Cost of studies to assess the effectiveness of the education and outreach efforts not available.	Underestimate
Permitting Efforts	Costs to agencies for permitting efforts associated with watercraft access facilities.	Costs associated with the Corps', DEP, USCG, and WMD's permitting efforts not available.	Underestimate
Additional Manatee Conservation Efforts	Costs to agencies for additional agency efforts that may be affected by manatee protection activities, including operating and maintaining stations and parks within the affected area.	Potential additional labor costs for activities that take longer due to operating boats at slower speeds not available.	Underestimate
		Consultation costs with the Service for building or expanding watercraft access facilities or performing maintenance activities not quantifiable.	Underestimate
	Costs of rescue and rehabilitation efforts, measures to update and implement catastrophic plan, other efforts to eliminate manatee mortality.	Socioeconomic impacts associated with increased manatee mortality not quantifiable.	Underestimate

<p align="center">EXHIBIT M-2 SUMMARY OF FACTORS AFFECTING BASELINE ADMINISTRATIVE COSTS</p>			
Category	Description of Category	Uncertainty or Other Factor Affecting Accuracy of the Baseline Economic Impact Estimate	Direction of Potential Bias
<i>Consumer Surplus Effects</i>			
Marina Users	Surplus effects incurred because new boaters will be unable to rent marina dock slips and choose not to go boating.	Historical marina slip permitting rates are assumed to continue into the future.	Underestimate
		Information on watercraft access facility substitution not available. Assumes new boat registrants who are unable to obtain a marina slip would choose to stop boating. Other available substitutes may be available, such as borrowing a vacant dock, mooring, etc.	Overestimate
		Dry storage capacity information not available. Marinas may increase dry storage capacity in response to increased demand instead of constructing additional slips.	Overestimate
		Historical marina slips permitted may not reflect future unmet marina demand. Assumes permitted slips are built and utilized. Also, marinas may apply for permits in the absence of demand.	Overestimate
Boat Ramp Users	Impacts incurred because newly registered boaters will be unable to access boat ramps and will choose not to go boating.	Information on watercraft access facility substitution not available. Assumes that once boat ramps are too congested, some boaters will choose not to go boating.	Overestimate
		Range of impacts reflects uncertainty regarding when boat ramp capacity will be reached (e.g., parking space occupancy and ramp capacity are unknown).	Overestimate
		Uncertain at what level individuals perceive boat ramp congestion as too great to continue with the activity.	Uncertain
		Assumes that boat ramps are currently filled up to capacity. Boat ramps are geographically located in areas that may not coincide with demand. If there is available capacity, the analysis will overstate impacts. If not, the analysis may understate impacts.	Uncertain

EXHIBIT M-2 SUMMARY OF FACTORS AFFECTING BASELINE ADMINISTRATIVE COSTS			
Category	Description of Category	Uncertainty or Other Factor Affecting Accuracy of the Baseline Economic Impact Estimate	Direction of Potential Bias
		Information on growth of out-of-state boaters using Florida boat ramps is not available.	Underestimate
<i>Regional Economic Impacts</i>			
Marine Goods and Services	Impacts represent the regional economic impacts resulting from an decrease in boating trips because of capacity constraints.	Historical marina slip and boat ramp permitting rates are assumed to continue into the future.	Underestimate
		Historical marina slips permitted may not reflect future marina demand. Assumes permitted slips would be built and utilized. Also, marinas may apply for permits in the absence of demand.	Overestimate
		Increased demand for dry storage capacity may offset some of the marine goods and services impacts associated with decreased dock and marina slip usage.	Overestimate
Marine Construction	Impacts represent the regional economic impacts resulting from a change in marine construction.	Historical permitting rates are assumed to continue into the future.	Underestimate
		Historical permitting data may not reflect future construction demand. Assumes permitted marina slips would be built.	Overestimate

Administrative Costs

This section details existing administrative costs associated with current manatee conservation efforts. These costs are related to the following activities: development and enforcement of manatee protection areas, agency administrative efforts, education and outreach, permitting efforts, and additional manatee conservation efforts.

Development and Enforcement of Manatee Protection Areas

Under baseline conditions, the Service and State and local agencies currently monitor and evaluate the need for manatee protection areas, as well as develop new protection areas as needed. In addition, the Service, FWC, USCG and other State and local agencies currently enforce restrictions on activities within these areas. Given the ubiquity of speed zones throughout the State of Florida, the impacts of these efforts on boaters under baseline conditions are significant. This section first reviews existing manatee protection areas and enforcement by stock, and then discusses existing economic impacts on boaters, agencies, and waterfront property owners. Exhibit M-3 lists the counties included in each stock for purposes of this analysis.

EXHIBIT M-3 Counties Included in Each Manatee Stock (listed in geographic order)			
NW	USJ	Southwest	Atlantic
Escambia Santa Rosa Okaloosa Walton Bay Gulf Franklin Wakulla Jefferson Taylor Lafayette Dixie Gilchrist Levy Marion (adjacent to Withlacoochee River) Citrus Hernando	Putnam (Palatka River and South) Marion (East of Withlacoochee River) Flagler (St. Johns River portion) Volusia (St. Johns River portion) Lake Seminole	Pasco Pinellas Hillsborough Manatee Sarasota Charlotte DeSoto Lee Glades Hendry Collier Monroe (South to Whitewater Bay)	Nassau Duval Clay St. Johns Putnam (North of Palatka) Flagler (Coastal portion) Volusia (Coastal portion) Brevard Indian River Okeechobee St. Lucie Martin Palm Beach Broward Miami-Dade Monroe (adjacent to Florida Bay and including Florida Keys)

Existing Manatee Protection Areas and Enforcement Levels

Both the Service and the State have established manatee protection areas where boat speeds or human entry are limited. Some of these areas were established as early as 1979. More recently, in August 2002, the Service enacted emergency designation of eight areas and proposed six other sites for designation as refuges or sanctuaries. In September 2002, the State approved ten new manatee

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protection zones. To date, there are speed zones in 27 counties in the four stocks considered by this study. Currently, both Federal and State agencies are involved in efforts to post and maintain signs describing these restrictions. The inland navigation districts [FIND and West Coast Inland Navigation District (WCIND)] are charged with carrying out these activities at the State level. Efforts are ongoing to establish a task force, consisting of involved agencies, to focus on improving the sign posting and maintenance process.

The Service and the State also expend a significant amount of effort on enforcement and compliance activities. Efforts include Florida's recent initiative to increase law enforcement positions, Service task force efforts (12 task force events were performed in 2001), completion of compliance studies, and provision of consistent signage (FIND/WCIND). In addition, USCG and local sheriffs departments participate in enforcement of manatee protection areas.

The current level of manatee protection areas and enforcement by stock are presented in Exhibit M-4 and discussed below.

EXHIBIT M-4 Summary of Existing Speed Zone and Enforcement Information			
Stock	Counties with Speed Zones	Counties without Speed Zones	Number of State Law Enforcement Officers as of 1/1/02
NW	4	13	122
USJ	6	0	31
Atlantic	14	2	248
Southwest ⁽¹⁾	8	4	149
All Stocks Combined ⁽²⁾	27	19	476
<p><u>Notes:</u></p> <p>(1) The number of counties with speed zones and state law enforcement officers in the Southwest Stock have been revised to correct for a double-counting error in the Draft EIS.</p> <p>(2) Estimates for all stocks combined do not equal the sum total because counties that fall in two stocks (Flagler, Marion, Monroe, Putnam, and Volusia), are included in estimates for both stocks, but not double-counted in the total.</p> <p>Sources: USFWS 2001a, USFWS 2001b, USFWS 2002c, ACOE 2002b.</p>			

I. Northwest Stock

Currently, 13 of the 17 counties in the NW Stock do not have speed zones. Four counties have established manatee protection areas, including Citrus, Hernando, Levy, and Marion counties. Both the Service and FWC have recently designated additional manatee protection areas in Citrus County. Specifically, the State has established two seasonal no entry zones in the Blue Waters area of the Homosassa River. As of January 1, 2002, there were at least 122 State law enforcement officers

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assigned to the counties in this stock.³ With the exception of the southern portion of the stock (Citrus, Hernando, and Levy counties), agency efforts to develop speed zones would continue to be minimal in this stock. Under baseline conditions, boaters in the Citrus County area would continue to experience impacts on their boating activities due to imposition and enforcement of speed zones.

ii. Upper St. Johns Stock

Each of the six counties included in this stock have established speed zones. Speed zones have been adopted throughout Volusia County, some as early as 1991. As of January 1, 2002, there were at least 31 State law enforcement officers assigned to the counties in this stock.⁴ Efforts to monitor, develop, and enforce speed zones would be expected to continue in this stock under baseline conditions.

iii. Southwest Stock

Of the 12 counties in this stock, DeSoto, Glades, Hendry, and Pasco counties remain without any speed zones. While no manatee protection areas exist in Charlotte, Manatee, and Monroe counties, there are boater safety speed zones. In certain areas of Lee County, near the Fort Myers power plant, manatee speed zones were established as early as 1979. In addition, FWC recently enacted new rules to establish additional manatee protection speed zones in Charlotte, Lee, Hillsborough, and Sarasota counties, and the Service recently designated Federal sanctuaries and refuges in Pinellas and Hillsborough counties. Agency efforts to evaluate and enforce speed zones in this stock are ongoing. As of January 1, 2002, there were at least 149 State law enforcement officers assigned to the counties in this stock.⁵ Efforts to monitor, develop, and enforce speed zones would be expected to continue in this stock under baseline conditions.

iv. Atlantic Stock

Nine of the thirteen counties identified by the State of Florida as “key” manatee counties are located in the Atlantic Stock (Duval, Volusia, Brevard, Indian River, St. Lucie, Martin, Palm Beach, Broward, and Miami-Dade counties); as a result, speed zones are widespread throughout the area. Most manatee protection speed zones in the stock have existed for over a decade in response to a 1989 State request for “key” counties to prepare Manatee Protection Plans. FWC has recently approved speed zones for a small portion of the St. Johns River in St. Johns County, the first

³Based on data provided to the Service from the Florida Fish and Wildlife Conservation Commission Division of Law Enforcement (FWC-DLE) summarized in Table 1 of the Manatee Assessment Report (USFWS 2002c). Data on the number of enforcement officers were not available for Gilchrist, Lafayette, and Marion counties.

⁴Based on data provided to the Service from the FWC-DLE summarized in Table 1 of the Manatee Assessment Report (USFWS 2002c). Data on the number of enforcement officers was not available for Seminole County.

⁵Based on data provided to the Service from the FWC-DLE summarized in Table 1 of the Manatee Assessment Report (USFWS 2002c).

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manatee protection area in this county. In addition, FWC recently approved additional manatee protection speed zones in Indian River County. Only two counties in this stock, Nassau and Okeechobee, do not have speed zones. Two counties, Flagler and Monroe, while without manatee protection speed zones do have boater safety speed zones. As of January 1, 2002, there were at least 248 State law enforcement officers assigned to the counties in this stock.⁶ Under baseline conditions, boaters in the Atlantic Stock would be expected to continue experiencing impacts on their boating activities due to imposition and enforcement of speed zones.

Impacts to Agencies

Under baseline conditions, agencies currently incur costs related to their efforts to develop and enforce manatee protection zones. While data are not available to determine the current breakout of agency-related impacts by stock, information is available on the current levels of expenditures for manatee speed zone development and enforcement for the entire State of Florida. Under baseline conditions, over the next five years, the Service expects to spend \$2,276,750, FWC expects to spend \$4,930,000, and other agencies will likely spend \$865,000 on developing and evaluating manatee protection areas.⁷ In the area of enforcement, the Service expects to spend \$3,460,000 over the next five years, and FWC will spend at least \$7,045,000.⁸ Existing and projected spending data related to enforcement provided by the USCG and local agencies are unavailable, but would add to these estimates of current impact. In total, developing and enforcing manatee protection areas, as currently required, would be expected to cost agencies over \$18.6 million over the next five years under baseline conditions.

Impacts to Boaters

When speed zones and enforcement exist, boaters' activities are likely to be affected. Specifically, boaters may travel at slower speeds than they would otherwise, and this may in-turn cause them to alter their activities on the water. For example:

⁶Based on data provided to the Service from the FWC-DLE summarized in Table 1 of the Manatee Assessment Report (USFWS 2002c).

⁷ These costs represent Service recovery plan costs for implementing Task numbers 1.3 and 3.3 over the five-year recovery period (USFWS 2001b), as well as \$140,350 in add-ons to the Service 2001 budget forecast to continue over the next five years (USFWS 2002e).

⁸ These costs represent Service recovery plan costs for implementing Tasks 1.4 and 1.11 over the five-year recovery period (USFWS 2001b) and \$32,000 in add-ons to the Service 2001 budget forecast to continue over the next five years (USFWS 2002e). The figure for FWC also includes an estimate of \$1.0 million/year over five years for FWC-DLE (USFWS 2001b, p. 119) and the State's one-time allocation of \$2.0 million for increased law enforcement (USFWS 2002b).

- Boaters alter either the number or duration/distance of trips taken;
- Boaters are affected by traveling at a reduced speed; and
- Boaters are affected by restrictions on where they can travel.

In many cases, when manatee protection areas are being implemented at a particular site, these impacts are limited due to the availability of substitute areas where boaters can undertake boating activities. In other words, the incremental impact of an individual speed zone being implemented and enforced may have been minimal. However, the overall impact of implementing and enforcing these zones throughout the State has likely had a much greater impact. For a number of reasons, it is extremely difficult to gauge the overall impact that development and enforcement of speed zones has on boaters under baseline conditions. First, manatee protection areas have been implemented throughout the state over a period of decades and enforcement of these areas has been variable. Second, few if any studies have been done to gather information regarding changes in boater behavior resulting from implementation of manatee protection areas.

As an example of the economic impact of speed zones, a 1992 study in Broward County estimated that:

“the imposition of the slow speed limit plan will reduce the number of boat trips taken by the Broward County boaters by an estimated 17 percent. It is estimated that this 17 percent in boat trips will have an economic impact of \$22 million in output on reduced boater boat-trip related expenses. In the marine industry survey, the 25 responding firms estimated that their business would be reduced by 30 percent under the proposed plan. This would imply a negative economic impact of \$58 million in output for these firms alone.” (Baker 1992)

While it is not possible to extrapolate from this study because of the limited sample and scenario on which its results are based, this study provides a general insight into the level of potential baseline impacts.⁹ Given the magnitude of the economic impacts suggested for Broward County, the likely baseline impacts on boaters resulting from implementation of slow speed zones throughout the State of Florida are likely substantial. Under baseline conditions, these activities would be expected to continue.

⁹ This study likely overstates the economic impacts of speed zone regulations because it relied on a non-random sample of 25 businesses identified by the Marine Industry Association of South Florida (which sponsored the study). The report states, “due to time limitations on this study, it was not possible to obtain the necessary detailed financial data from a sufficient number of firms to perform a complete economic impact analysis.” Also, the Broward County study relied on 365 survey responses to represent a population of over 40,000 registered boaters; it is not clear whether this sample is representative of the population of registered boaters.

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Impacts to Waterfront Property Owners

Florida waterfront property owners may benefit from manatee protection measures already in place. Speed zone enforcement measures in manatee protection areas are described earlier in this section. One study has shown that speed zone enforcement may provide an economic benefit to adjacent landowners.

Bell and McLean (1997) study the impact of posted Manatee Speed Zones on the property values of waterfront homes in Fort Lauderdale, Broward County, Florida. The authors find a strong positive relationship between property values and slow speed zones, and find no evidence that slow speed zones have a negative impact on home sale price. Slow speed zones were found to correlate with as much as a 15 to 20 percent increase in sale price, although this result has not been corroborated by other studies. The authors speculate that speed zones may increase property values by reducing noise and fast traffic, as well as making it easier for boats to enter and leave primary waterways.

In addition, due to reductions in boat wake associated with speed zones, property owners may experience some economic benefits related to decreased expenditures for maintenance and repair of shoreline stabilization structures (*i.e.*, seawalls along the water's edge). Due to the difficulty associated with estimating these potential maintenance and repair costs, no estimates are included in this estimate of baseline economic conditions. However, to the extent that property owners are aware of the lower maintenance costs in low-wake zones, this benefit may already be incorporated into the value of the property. Under baseline conditions, waterfront property owners would continue to benefit from proposed increase property values due to slow speed zones and from decreased expenditures for maintenance and repair of shoreline stabilization structures.

Agency Administrative Efforts

Under baseline conditions, agencies would continue to perform administrative activities related to reporting, monitoring, and research. A variety of Federal, State, and local agencies are involved in these activities. Examples of these activities include:

- *Annual reporting under ESA and Save the Manatee Trust Fund.* Both the Service and FWC are required to produce annual reports discussing their manatee recovery efforts.
- *Monitoring the status of manatee populations.* Monitoring the manatee population involves a variety of activities such as: coordination of the Manatee Population Status Working Group (MPSWG), population modeling efforts, and continuing existing work to gather manatee population information utilizing methods such as: Manatee Individual Photo-identification system, carcass salvage program, PIT-tagging, telemetry studies, and aerial surveys. Agencies involved in these efforts include the Service, USGS Sirenia Project, FWC's FMRI, Mote Marine Lab, and others.
- *Monitoring and evaluating causes of manatee mortality.* This information is primarily collected under FWC's mortality and rescue efforts. The FWC Marine Mammal Pathobiology Laboratory will continue to use the Southeast U.S. Manatee Mortality Database.

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- *Researching factors that affect manatee health, well-being, physiology, and ecology.* This includes studies of the effectiveness of watercraft speed zones, boater compliance, the effects of speed zones and facility siting on boater behavior, development of technologies to reduce manatee/watercraft interactions, and much more ongoing research. FWC, Mote Marine Lab, and others are continuing these research efforts. In addition, the Service and SMC continue to fund various research efforts.
- *Monitoring manatee habitat.* Existing efforts include the Habitat Working Group, Warm-Water Task Force, and the Springs Task Force (working to establish minimum flow levels at natural springs). The agencies involved in these efforts include the Service, State agencies (including water management districts) and others.
- *Development and implementation of County level Manatee Protection Plans.* In 1989, the State of Florida required 13 “key” manatee counties to develop MPPs. As of May 2002, only six had completed plans that were approved by the FWC. Efforts for the remaining seven counties to develop these plans continue at the local level with funding from various State and Federal sources.

Given the nature of the monitoring, reporting and research efforts, a breakdown of associated costs by stock is not feasible. Most of these activities are undertaken on a Statewide level by FWC and Service staff. Based on existing and expected efforts, the minimum estimated cost of agency administrative efforts related to manatee recovery efforts over the next five years is approximately \$15.4 million under baseline conditions.¹⁰

Education and Outreach Efforts

Under baseline conditions, agencies would continue to perform education and outreach associated with manatee recovery. A variety of Federal, State, and local agencies, as well as nonprofit and for-profit entities, are involved in these activities. Examples of these activities include:

- *Developing public education and outreach materials.* A wide range of entities including the Service, FWC, and FPL are involved in developing and producing materials used to inform the public about the manatee, manatee protection areas, and manatee viewing guidelines, as well as other manatee issues.
- *Coordinating development of manatee awareness programs and materials.* Activities include development of consistent manatee viewing and approach guidelines, and ensuring consistency of messages through development of a Manatee Education committee and coordination of public release of information through the media.

¹⁰ These costs represent costs estimated in the Recovery Plan Implementation Schedule for Objective 2 and Tasks 3.1, 3.2, and 3.4 (USFWS 2001b) as well as \$255,650 in add-ons to the Service budget forecast to continue over the next five years (USFWS 2002e).

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- *Identifying target audiences and key locations for outreach.* These efforts include identifying key manatee counties, high watercraft use areas, and manatee observation areas.
- *Utilizing the rescue, rehabilitation, and release programs to educate the public.* These programs are ongoing and operate under a variety of public and private agencies, and provide an effective means of outreach for informing the public on manatee issues. These efforts involve 18 private organizations, coordinated under the Service's Interagency Oceanaria Working Group.
- *Informing stakeholders and concerned citizens about manatee protection efforts.* These efforts are coordinated through the Service's Jacksonville Field Office.

A breakdown of costs associated with education and outreach efforts was not available by stock. Based on existing and expected efforts, expenditures for education and outreach related to manatee recovery over the next five years are expected to be approximately \$3.1 million under baseline conditions.¹¹

Permitting Efforts

Various agencies in the State of Florida are involved in reviewing permit applications. There are three primary types of permitting efforts for which agencies are required to make efforts to minimize impacts to manatees and their habitat. These include:

- *Permits for development activities (e.g., boat docks, boat ramps, marinas, other boat-related facilities) and dredge and fill activities.* Permit applications for these types of activities are reviewed by the Corps and DEP or the Water Management Districts (WMDs). These agencies are required to determine the potential for the project to affect manatee or manatee habitat. Considerations include: the construction process, the permanent effect of the facility being proposed, and indirect and cumulative effects of the project. If the project "may affect" the manatee or any other listed species, then further review is required. The Service (and in some cases the National Oceanic and Atmospheric Administration, Fisheries Division (NOAA-Fisheries, previously the National Marine Fisheries Service) provides consultation to the Corps and other Federal agencies, while FWC provides assessments and recommendations to DEP and WMDs.
- *Permits for marine events (e.g., boat races, regattas, fishing tournaments, and water-ski events).* Permit applications for these types of events are reviewed by USCG. When an activity may affect manatees or any other listed species, the USCG consults with the Service.

¹¹These costs represent \$1,320,000 estimated in the Recovery Plan Implementation Schedule for Objective 4 over five years (USFWS 2001b) as well as funds administered under the Save the Manatee Trust Fund and the Advisory Council on Environmental Education (FWC 2001b). For FY 2000-2001, the Advisory Council awarded about \$350,000 in grants; over a five-year period, grants for environmental education amounting to \$1,750,000 are assumed. This does not include the costs of rescue and rehabilitation efforts.

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Standard guidelines have been prepared to provide information regarding the types of events and locations where manatee protection conditions are necessary.

- *Permits for power plants and other industrial outfalls (e.g., NPDES permits).* These types of permit applications are reviewed by DEP. In areas where a plant has the potential to affect manatees because of the attraction of a warm-water discharge, FWC works with the utility to develop a manatee protection plan which is then required as part of the permit.

Under baseline conditions, permitting efforts for manatee related reviews over the next five years are expected to cost approximately \$2.5 million for the Service and \$1.4 million for FWC.¹² No cost estimates were available for the Corps, DEP, USCG, or WMD activities. The estimate of \$500,000 per year for Service reviews primarily represents labor costs for reviewing applications.

Additional Manatee Conservation Activities

In addition to the agency administrative and permitting activities already discussed, there are a variety of other activities that help to characterize the baseline economic conditions.

First, under baseline conditions, a variety of Federal and State agency activities are currently taking place in Florida waters inhabited by manatee:

- U.S. Army Corps of Engineers (Corps). The Corps performs numerous activities requiring operations of: channel condition surveys, barge towing, construction activities, aquatic plant management, natural resource management activities, diving operations, contract surveys and inspections, water patrol and shoreline inspections. These activities are expected to continue over the next five years. The Corps also operates and maintains watercraft access facilities including public boat ramps, public boat camping sites, and a boathouse for Corps vessels. Currently, no new facilities are planned in the next five years.¹³
- National Marine Fisheries Service (NOAA-Fisheries). NOAA-Fisheries manage marine sanctuaries and reserves in waters inhabited by Florida manatees. These activities are expected to continue over the next five years.
- United States Coast Guard (USCG). USCG operates watercraft in manatee habitat, for the purposes of: search and rescue, law enforcement, marine environmental protection, and tending aids to navigation. These activities are expected to continue over the next five years. USCG also operates 16 boating facilities within manatee areas in Florida. While USCG has no plans for new facilities in next five years, additions to existing marinas occur about one every two years, thus, two expansions are expected in next five years.¹⁴

¹²These costs represent costs estimated in the Recovery Plan Implementation Schedule for Task 1.2 (USFWS 2001b).

¹³ ACOE Response to Interagency Questionnaire (ACOE 2002a).

¹⁴ USCG Response to Interagency Questionnaire (USCG 2002).

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- National Park Service (NPS). NPS has management responsibilities in the State of Florida for several national parks, historic sites and monuments containing waters inhabited by manatees. NPS activities include: law enforcement, search and rescue, maintenance, research, resource inventory and monitoring, and natural and cultural resource management and protection. These activities are expected to continue over the next five years. In addition, NPS operates boating facilities for NPS and public use. NPS has no plans for new facilities in next five years.¹⁵
- Florida Fish and Wildlife Conservation Commission (FWC). The FWC is involved in a variety of management activities related to the enhancement and maintenance of fish and wildlife habitat. State manatee protection rules are established by the Florida FWC to restrict the speed and operation of vessels, where necessary, to protect manatees from harmful collisions with vessels and from harassment. In areas that are especially important to manatees, the State's rules can prohibit or limit entry into an area as well as restrict what activities can be performed in the area. The FWC is authorized to adopt these rules by the Manatee Sanctuary Act (370.12(2), Florida Statutes). The rules appear in Chapter 68C-22 of the FAC. Local governments can also establish manatee protection zones through the adoption of a local ordinance. These zones must be approved by FWC before they can take effect, as required by Chapter 370.12(2)(o), F.S. The only other limitation on a local government's ability to establish manatee protection zones is that local zones cannot include waters within the main marked channel of the Florida Intracoastal Waterway or waters within 100 feet thereof. The FWC manatee protection rulemaking process is described in rule 68C-22.001, F.A.C.
- Florida Department of Environmental Protection (DEP). The DEP oversees the Florida Park Service, and the State's land and water conservation program. The State's Water Management Districts, which manage the stormwater management program and provide local governments planning assistance, fall under DEP jurisdiction. At the State level construction of watercraft access facilities is regulated by the DEP and the water management districts pursuant to the State's Environmental Resource Permit Procedures (62-343 F.A.C.). Permit applications received by the State regulatory agencies are also reviewed by the FWC, Bureau of Protected Species Management (BPSM), which utilizes the FWC Manatee ERP Coordination Guidance, and provides an environmental assessment of potential adverse impacts to manatees from regulated activities.

For these agency activities, given the available information, it is not possible to estimate the current socioeconomic impacts resulting from existing manatee protection efforts. For example, there are some existing impacts in the form of agencies having to operate boats at slower speeds while performing various activities in manatee protection areas. This results in additional labor costs, as activities take longer than they would otherwise. In addition, agencies need to consult with the Service or FWC when building or expanding watercraft access facilities or performing maintenance activities. This may result in costs to agencies for delaying a project and for modifying a planned construction project to conform to standard manatee construction conditions.

¹⁵ NPS Responses to Interagency Questionnaire (NPS 2002a, NPS 2002b).

Second, under the current recovery plan, there are several ongoing activities, including:

- Rescue and rehabilitation efforts;
- Efforts to eliminate manatee deaths from a variety of sources; and
- Measures to update and implement the catastrophic plan.

Under baseline conditions, these additional ongoing recovery efforts are expected to total \$11.2 million over the next five years.¹⁶

Third, manatee mortality caused by watercraft strikes is currently projected to increase by seven percent per year.¹⁷ This may result in an increased work load for those involved in carcass salvage and for FMRI's pathobiology lab. Over the ten-year period from 1991-2001, manatee mortality caused by watercraft strikes averaged 56 deaths per year. An increase of seven percent would add an additional four to five manatee deaths per year. The costs associated with this increased workload would likely have only a minimal impact on the budgets of the agencies involved in these activities under baseline conditions.

Fourth, increasing manatee deaths will also potentially result in legal costs from lawsuits arising from these unauthorized "take" activities under baseline conditions. The magnitude of these impacts is unknown.

Consumer Surplus Effects

This section presents the consumer surplus effects of existing restrictions on permitting of multi-slip watercraft access facilities that would occur over the five year period of the rule under baseline conditions. Based on current policies for reviewing watercraft access facility permit applications under section 7 of ESA and other directives, the Service has been unable to concur with a number of multi-slip permit applications in the Atlantic and Southwest Stocks. In particular, the Service has been unable to concur with approximately eight percent of these permits in the Atlantic Stock, and 20 percent in the Southwest Stock (Exhibit M-5).

¹⁶ These costs represent costs estimated in the Recovery Plan Implementation Schedule for Tasks 1.5, 1.6, 1.7, 1.9, and 1.10 (USFWS 2001b) as well as \$21,000 in add-ons to the USFWS 2001 budget forecast to continue over the next five years (USFWS 2002e).

¹⁷FMRI 2000.

EXHIBIT M-5 Multi-Slip Watercraft Access Facility Permit Denial Rate			
Stock	Total Permits Considered⁽¹⁾	Number of Permits Denied/Held⁽²⁾	Permit Denial Rate
NW	14	0	0%
USJ	3	0	0%
Atlantic	48	4	8%
Southwest	55	11	20%
⁽¹⁾ Permits considered included those multi-slip permits issued from 2001-2002 (USFWS 2002d), as well as those permits denied/held. ⁽²⁾ USFWS 2002h and USFWS 2003.			

Consumer surplus effects due to permitting restrictions include surplus losses accrued by marina and boat ramp users, as discussed below.

Marina Users' Consumer Surplus Loss

Under baseline conditions, the upward trend in boater registration is likely to place new demands on existing watercraft access facilities. Under current permitting restrictions some new facilities would not be constructed and boaters' choices of access alternatives would be limited. Assuming that all current marina slip renters continue to rent marina slips, new demand is likely to reach and surpass current available capacity, especially in areas with little current excess capacity. This capacity constraint would result in economic surplus losses for those boaters who are unable to rent slips at a marina under baseline conditions.

We expect that marina capacity could become an issue for boat users under baseline conditions based on our research of boating facility capacity. In one study (Bell 1990), the author found that Florida saltwater marinas would not be able to satisfy future boater demand because of a variety of environmental constraints on slip expansion as well as land competition. A variety of sources, including Manatee Protection Plans, Boating Activity Studies, Boating Facility Plans, and other official policy documents indicate that average occupancy estimates throughout the year provided by individual counties range from approximately 50 to 90 percent. Occupancy estimates fluctuate seasonally and are generally higher during the peak winter months (January to March).¹⁸

¹⁸ We recognize that occupancy levels may vary significantly by county and by season. For example, marina occupancy in Naples is at or near 100 percent and generally includes a waiting list. In the Tampa-St. Petersburg area occupancy varies, but is generally below 100 percent. Several public comments provided occupancy data that fit within the range of occupancy rates utilized in the analysis. Specifically, one comment indicated that occupancy of wet slips in Lee County may vary from 40-60% in the summer to 100% in winter (Riley 2003). In addition, the most recent inventory of Duval County marinas indicated an average occupancy rate of 87% for wet slips for 2001-2002 (Jacksonville University 2002).

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The development of occupancy estimates and the date of the most recent estimate varies from county to county. For example, some counties relied on academic studies that surveyed marina owners to compile a countywide inventory. Other counties made field visits to marina facilities and compiled information on the number of slips and the current (*i.e.*, at the time of the study) or average occupancy rate. Some counties examined a subsample of marinas to develop a county-wide estimate. Note that while most counties relied on past boating studies, others developed primary data through recent inventory work. The majority of these studies were conducted in the mid 1990's. We would expect marina slip occupancy to have grown since that time, as boater registration has continued to grow. Appendix K describes these reports.

The aforementioned reports suggest that limits on marina slip supply will impact marina users. This, in turn, implies that marina slip permit denials would result in unmet marina slip demand. In particular, we assume that marina slip permit denials would affect boaters and the marine industry.

This section estimates the economic surplus losses that accrue to boaters in this category under baseline conditions. We assume that boaters who are unable to obtain a marina slip because of capacity constraints will choose not to go boating. In addition to economic surplus losses, a regional economic impact may result from reduced boating activity and reduced marina slip construction activity. These regional economic impacts are discussed later in this section.

To estimate the extent of unmet marina slip demand due to marina slip permit denials under baseline conditions, we obtain permitting information from the Corps.

- The Corps' permitting data indicate that the number of marina slips permitted have fluctuated over the years (Exhibit M-6).

EXHIBIT M-6					
Annual Marina Slips Permitted					
Stock	1998	1999	2000	2001	2002
NW	20	0	0	0	90
USJ	40	40	60	50	10
Atlantic	280	210	220	120	110
Southwest	30	810	30	230	740
Four Stock Total ^a	360	1,060	300	400	950
^a Totals may not add due to rounding					

- Given the fluctuation in marina slips permitted over the past five years, we assume that for each stock, future demand for marina slips reflects the highest annual number of slips permitted from this five-year period. For example, for the NW Stock, we assume the annual marina slip demand to be 90 (Exhibit M-7).

EXHIBIT M-7 Projected Annual Demand for Marina Slips	
Stock	Annual Demand
NW	90
USJ	60
Atlantic	280
Southwest	810
Four Stock Total	1,240

- We calculate the five-year unmet marina slip demand as an accumulation of demand across the five-year period of the rule (Exhibit M-8). That is, marina slip users who are unable to obtain a slip in year one, continue to represent unmet demand for that slip in years two through five, because the slips are unavailable during all of those years. Similarly, marina slip users who were unable to obtain a slip in year four continue to represent unmet demand for that slip in year five.
- Based on existing conditions, we estimate that the Service will recommend denial of eight percent of marina slip permit applications in the Atlantic and 20 percent in the Southwest Stock under baseline conditions. Based on these permit denials, we assume that cumulatively 2,770 boaters will not be able to rent a marina slip over the five-year period (Exhibit M-8). This figure is used to calculate the five-year economic surplus loss.

EXHIBIT M-8 Estimate of Unmet Marina Slip Demand for Five-Year Period of Regulation			
Stock	Projected Annual Slip Demand	Recommended Permit Denial Rate	Unmet Five-Year Marina Slip Demand (i.e., Cumulative)
NW	90	0%	0
USJ	60	0%	0
Atlantic	280	8%	340
Southwest	810	20%	2,430
Four Stock Total	1,240	--	2,770

To estimate the economic surplus loss associated with expected capacity constraints at marinas in the four stock areas, we apply a boating value surplus estimate to the estimate of unmet five-year marina slip demand (Exhibit M-9). We assume that under constrained capacity, boaters who are unable to obtain marina slips will choose not to go boating. The economic surplus loss for these boaters is the willingness to pay for a day of boating, applied to the number of lost boating trips.

The economic valuation literature provides a few studies that are appropriate to apply to the lost boating days for marina slip users in Florida. In particular, three studies provide an average boating

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surplus estimate of \$40 per day (2001 dollars) (Bhat *et al.* 1998; Bergstrom and Cordell 1991; Walsh *et al.* 1992).¹⁹

- Bhat *et al.* (1998) estimate the economic value of various outdoor recreational activities across different ecoregions of the U.S. The authors defined ten ecoregions based on similarities in functioning ecosystem characteristics. The study uses the travel cost method to estimate a variety of recreation values, including motor boating and waterskiing. While the study does not provide a motor boating value for the ecoregion containing Florida, it does provide a motor boating value for the region containing Maryland, West Virginia, Virginia, North Carolina, South Carolina, Tennessee, Georgia, and Alabama. The authors estimate the average value for a day of motor boating and water skiing to be approximately \$47 (2001 dollars).
- Bergstrom and Cordell (1991) conduct an analysis of the value of outdoor recreational activities in the U.S. The authors sample U.S. counties and apply a multi-community, multi-site travel cost model to estimate demand equations for 37 outdoor recreational activities and trip values, including motorized boating. The authors estimate the average value for a day of motorized boating to be approximately \$25 (2001 dollars).
- Walsh *et al.* (1992) provide a published summary of net economic values per recreation day for a variety of types of recreation, including motorized boating. Their summary includes information from 120 outdoor recreation demand studies and provides mean and median value estimates for 19 different categories of benefits. The summarized studies use a variety of methodologies, including travel cost and contingent valuation models. The authors estimate the average value for a day of motorized boating to be approximately \$49 (2001 dollars).

We apply this value estimate to the approximate number of lost boating days due to unmet marina slip demand. We estimate that, on average, boaters in Florida take approximately 60 boating trips per year. Four Florida county-level studies indicate the average number of boating days for boat ramp users and private marina users range from 54 to 76 days per year (GEC 1999; GEC 2001a; GEC 2001b; GEC 2001c). The losses to these boaters is the willingness to pay for a boating day multiplied by the unmet slip demand over the five-year period and the estimated number of boating trips taken per year.

Under baseline conditions, the present value surplus loss to marina users over the five-year period would range from \$5.2 to \$6.0 million (Exhibit M-9). These figures are discounted using a three and seven percent discount rate.

¹⁹While a study of surplus user values exists for the Florida Keys/Key West area (Leeworthy and Bowker 1997), this report does not provide a value that is appropriate to apply to our analysis. This report estimates an aggregate value for a user-day of activities that may include such recreation types as snorkeling, scuba diving, boating, fishing, windsurfing, and museuming. This study does not provide a recreation-type specific value for each activity. The authors assume that within this aggregate value, each activity has the same value.

EXHIBIT M-9 Surplus Effects for Marina Users			
Stock	Unmet Five Year Marina Slip Demand (i.e., Cumulative)	Five Year Economic Surplus Loss (millions of 2001 dollars)	
		3% Discount Rate	7% Discount Rate
NW	0	\$0	\$0
USJ	0	\$0	\$0
Atlantic	340	\$0.7	\$0.6
Southwest	2,430	\$5.2	\$4.6
Four Stock Total^a	2,770	\$6.0	\$5.2
^a Totals may not add due to rounding			

Boat Ramp Users' Consumer Surplus Loss

Under baseline conditions, the Service is currently unable to concur with permits for construction of some multi-slip watercraft access facilities in the Atlantic and Southwest Stocks. These restrictions are likely resulting in an excess demand for existing boat ramp facilities. A 1995 Statewide boat ramp study (Bell 1995) notes that boat ramp capacity constraints could be reached even without a restriction on the construction of new facilities. In particular, this study suggests that “the current [*i.e.*, 1995] and possibly potential supply of coastal boat ramps will be inadequate to accommodate present and future boater demand for these facilities in many, if not all, of Florida’s 35 coastal counties” (Bell 1995, p. 1). This study also shows that, depending on the assumptions of the time needed to launch and retrieve a boat at a boat ramp, the majority of counties will need more boat ramp lanes than were available in 1992.

With approximately two-thirds of the Florida boater population relying on boat ramps, an estimated 31,200 new boaters will choose to use boat ramps each year, as shown below.

- Recreational boating registration in the four stocks grew by approximately 93,600 between 1999 and 2001 (Florida Department of Safety and Highway Vehicles 2002). Thus, approximately 46,800 additional boats require access to Florida’s marine resources each year.²⁰ Based on boat registration trends from 1999 through 2001, we estimate that future registration growth will reflect historical registration increases (Exhibit M-10).

²⁰Limited data are available for estimating losses accruing to out-of-State boaters who use Florida waters. These types of boaters are accounted for in our discussion of capacity constraints, however we are unable to forecast growth in demand for these boaters to estimate an out-of-State boater economic surplus effect.

EXHIBIT M-10 Approximate Annual Growth in Boat Registration by Stock (Based on 1999 - 2001 data)	
Stock	New Boat Registrations
NW	7,700
USJ	3,100
Atlantic	19,200
Southwest	16,800
Four Stock Total	46,800

- We estimate that approximately two-thirds of Florida boaters use boat ramps to access the water (Bell 1995). Based on boat registration data, approximately 31,200 of the 46,800 new boat registrations will seek boat ramp access over marina slip rental (Exhibit M-11).

EXHIBIT M-11 Approximate Annual Growth in Ramp Users by Stock	
Stock	Ramp Users
NW	5,200
USJ	2,100
Atlantic	12,800
Southwest	11,200
Four Stock Total*	31,200
* Totals may not add due to rounding	

Currently, boat ramp facilities in some Florida counties are not sufficient to meet current demand; however, specific data describing the current congestion levels at boat ramps across the state are limited. County boating plans generally do not identify user trends at boat ramps or identify current levels of congestion. One exception, Collier County, indicates some level of existing congestion at specific ramps, noting that parking lots frequently fill to capacity during peak periods, such as weekends and holidays. While there were some planned expansions and new docks in the county, no updated information on boat ramp construction is available (Collier County Natural Resources Department 1995). Because we do not have data on how boaters react to different levels of congestion at boat ramps, we provide a range of estimates in our analysis.

Under baseline conditions, as boat ramp congestion increases over time under baseline conditions, boaters may decide not to use a boat ramp to launch their vessel and may choose to stop boating. Bell's survey indicated that boaters were deterred from using ramps because of congestion, ramp shortages, poor ramp safety, high launch fees, poor quality, and inconvenience. We estimate economic surplus losses to boat ramp users, under baseline conditions, based on information on projected growth in boat ramp usage, existing capacity, and estimates of boating values.

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- We assume that counties have built a sufficient number of ramps throughout the four stock area to meet the 2000 demand predicted by Bell's study. Further, we assume that the five-year demand Bell projects from 2000-2005 is equivalent to the increased demand for the five-year period of the rule. We assume that prior to 2000, the construction industry had been able to respond to this projected demand.
- Assuming that all current boat ramp users continue to use boat ramps, we estimate the growth in boat ramp usage to be approximately 31,200 users annually (Exhibit M-11).
- To estimate the annual number of boat ramp-initiated boating trips, we apply Bell's 1995 estimate of 32 boating days per year to our estimated number of new boat ramp users. In this study, Bell reports several estimates of the average number of boating days per household at boat ramps in Florida. The results range from 24 to 44 days per year, and reflect an average of approximately 32 days per year. The estimate of boating days per year is slightly lower than the assumption used regarding marina users. However, based on the time and effort required to trailer boats to boat ramps, it is reasonable to assume that fewer recreational boating days are associated with boat ramp access than with marina slip users.
- We provide a range of surplus loss estimates based on assumptions about the lost number of boating trips estimated under baseline conditions, as follows:
 - The high end range (Exhibit M-12) represents the maximum possible surplus loss by assuming that all new boat ramp users react to increased levels of congestion by choosing not to go boating. This range likely overestimates the actual surplus losses, as some ramp users are likely to travel longer distances to find less congested ramps, or may simply reduce – rather than completely eliminate – their recreational boating activity.
 - We assume that under the low range scenario, the projected increases in ramp congestion will not adversely affect the user population and therefore there will be no surplus effect under baseline conditions.
- As with the surplus loss associated with marina users, we calculate the five-year reduction in number of boat ramp trips as an accumulation of demand across the five year period of the rule (Exhibit M-12). That is, boat ramp users who are unable to use ramps in year one, also are unable to use ramps in years two through five. Similarly, boat ramp users who are unable to use ramps in year four do not use ramps in year five.

EXHIBIT M-12 Estimated Reduction in Boat Ramp Days					
Stock	Average Annual Number of Boat Ramp Trips	Annual Number of New Boat Ramp Users	Recommended Permit Denial Rate	Five-Year Reduction in Number of Boat Ramp Trips Low End (i.e., Cumulative)	Five-Year Reduction in Number of Boat Ramp Trips High End (i.e., Cumulative)
NW	32	5,200	0%	0	0
USJ		2,100	0%	0	0
Atlantic		12,800	8%	0	491,000
Southwest		11,200	20%	0	1,074,000
Four Stock Total		31,200	-	0	1,565,000

- We estimate an economic surplus value for a day of motorized boating from an average of three studies, as described in the previous section. We estimate this value to be approximately \$40 to the five-year reduction in boat ramp trips per day (2001 dollars).

Applying the economic surplus value for a day of motorized boating (\$40) to the reduction in boat ramp trips we estimate economic surplus loss for boat ramp users. Under baseline conditions, the present value surplus loss to boat ramp users over the five-year period ranges from \$0 to \$56 million (Exhibit M-13). These figures are discounted using a three and seven percent discount rate.

EXHIBIT M-13 Surplus Effect to Boat Ramp Users (millions of 2001 dollars)					
Stock	Five-Year Reduction in Number of Boat Ramp Trips (low/high)	Five-Year Economic Surplus Loss			
		3% Discount Rate		7% Discount Rate	
		Low	High	Low	High
NW	0 / 0	\$0	\$0	\$0	\$0
USJ	0 / 0	\$0	\$0	\$0	\$0
Atlantic	0 / 491,000	\$0	\$17.6	\$0	\$15.4
Southwest	0 / 1,074,000	\$0	\$38.6	\$0	\$33.7
Four Stock Total^a	0 / 1,565,000	\$0	\$56.2	\$0	\$49.0
^a Totals may not add due to rounding					

Summary of Consumer Surplus Losses

Total consumer surplus losses for both marina users and boat ramp users under baseline conditions would be approximately \$5.2 to \$62.2 million over the five-year period of the rule.

Regional Economic Impacts

Under baseline conditions, there would be a continuing impact on expenditures in the marine industry due to existing permitting restrictions, which would result in a number of secondary effects on the Florida economy. First, a continued loss of marine access points is likely to result in a decrease in recreational boating activity.²¹ This decrease in boating activity is likely to lead to a reduction in the demand for marine retail sales, such as boats, clothing, general marine merchandise and other related goods and services. Second, the existing limits on the authorization and construction of such facilities as marinas and boat ramps is likely to result in a continued reduction in the demand for marine construction services. Decreased expenditures in these industries may result in secondary effects on related sectors of the Florida economy. Some of these related sectors may be closely associated with the marine industry, such as fishing accessories and sporting goods industries. However, some sectors may be less closely associated with the marine industry, such as the radio and communications equipment and banking industries. For example, a decrease in boat sales may lead to a decrease in banking industry revenue due to the decrease in boat-related loans issued.

The marine industry is a substantial contributor to Florida's economy (Exhibit M-14). As a way to approximate the contribution of the marine industry to the Florida economy, we considered revenue information collected by the Florida State Department of Revenue for two industry sectors. Boat dealers and motor boat and yacht dealers in the four stocks generate approximately \$4.79 billion in annual revenue. In addition, parking lots and boat docking establishments generate approximately \$702 million in annual revenue.²² The majority of the marine industry is located in the Atlantic Stock, where there are \$2.92 billion in annual expenditures on motor boat and yacht dealers and \$413 million in annual expenditures at parking lots and boat docking establishments.

²¹Existing literature indicates that marine access and boating activity are positively correlated; for example, see Siderelis, *et al.* (1995).

²² These figures are based on data provided by the Florida Department of Revenue. The Florida Department of Revenue classified retail gross sales by dividing them into "like industries" or industry "Kind Codes." Kind Code 28, "Motorboats and Yacht Dealers," includes the retail sales of motorboats, yachts, and accessories, while Kind Code 83, "Parking Lots, Boat Docking, and Storage," includes boat docking and storage, parking lots, and parking structures. Note that Kind Code 83 includes several nonmarine sectors. Thus, it will over-represent marine-related expenditures.

EXHIBIT M-14 Gross Sales of Selected Sectors of Florida Marine Industry (millions of 2002 dollars)		
Stock	Motorboat and Yacht Dealers (Kind Code 28)²³	Parking Lots, Boat Docking, and Storage (Kind Code 83)²⁴
NW	\$339	\$45
USJ	\$78	\$89
Atlantic	\$2,919	\$413
Southwest	\$1,455	\$155
Four Stock Total	\$4,791	\$702
^a Totals may not add due to rounding. Source: Florida Department of Revenue 2002.		

Without specific marine industry revenue data, we estimate the initial direct economic impacts based on expected changes to recreational boating and marine construction. The analysis relies on regional economic modeling to estimate secondary effects. In particular, it utilizes a software package called IMPLAN to estimate the total economic effects of the reduction in economic activity in the marine industry associated with this proposed rule. IMPLAN is commonly used by State and Federal agencies for policy planning and evaluation purposes. The model draws upon data from several Federal and State agencies, including the Bureau of Economic Analysis and the Bureau of Labor Statistics.

IMPLAN translates initial changes in expenditure that are entered into the model into changes in demand for output from affected industries and corresponding changes in demand for inputs to those industries and so on. These effects can be described as *direct*, *indirect*, or *induced*, depending upon the nature of the change.

- *Direct effects* represent changes in output attributable to a change in demand or a supply shock. These are specified initially by the modeler.
- *Indirect effects* are changes in output of industries linked to those that are directly affected by the initial change in expenditures.
- *Induced effects* reflect changes in household consumption arising from changes in employment (which in turn are the result of direct and indirect effects). For example, changes in employment in a region may affect the consumption of certain goods and services.

²³This industry sector consists of motorboat, yacht, marine parts, accessories, and boat dealers.

²⁴ This industry sector includes boat docking and storage, parking lots, and parking structures. Note that this sector includes several nonmarine sectors. Thus, it will overrepresent marine-related expenditures.

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These categories are calculated for all industries and aggregated to determine the regional economic impact.

There are two important caveats relevant to the interpretation of IMPLAN model estimates, generally, and within the context of this analysis. The first is that the model is static in nature and measures only those effects resulting from a specific policy change (or the functional equivalent specified by the modeler) at one point in time. Thus, IMPLAN does not account for posterior adjustments that may occur, such as the subsequent reemployment of workers displaced by the original policy change. In our application, this caveat suggests that the long-run net output and employment effects resulting from changes in boating and permitting regulations are likely to be smaller than those estimated in the model, which will lead to an upward bias in our estimates. A second caveat to the IMPLAN analyses is related to the model data. Our IMPLAN analysis relies upon input/output relationships derived from 1998 data. Thus, in our analyses we assume that this characterization of the Florida economy is a reasonable approximation of current conditions. If significant changes have occurred in the structure of Florida's economy, our results may be sensitive to this assumption. However, the magnitude and direction of any such bias are unknown.

Impacts of Decreased Demand for Marine Goods and Services

Under baseline conditions, a reduction in recreational boating trips resulting from existing permitting restrictions will have a regional economic impact on the Atlantic and Southwest Stocks. We assume that individuals who cannot obtain marina slips or boat ramps will not participate in boating activities, resulting in a decrease of recreational boating trips. First, we estimate the regional economic impact associated with the reduction in boat trips from individuals who are unable to obtain marina slips; then we estimate the regional economic impact associated with the reduction in boat trips from individuals who are unable to find an uncongested boat ramp. We find that regional economic impact of a reduction in marina user and boat ramp user boating trips in the Atlantic and Southwest Stocks ranges from approximately \$4 to \$48 million in year five of the rule (Exhibits M-18 and M-24). Year five estimates are chosen to illustrate the extent of these annual regional economic impacts because of the cumulative nature of these impacts.

Marina Slip Users

- As described in the "Marina Users' Surplus Loss" section, we assume that the unmet marina slip demand corresponds to an accumulated number of boaters who take fewer boating trips. Based cumulative unmet demand for marina slips, we assume approximately 920 boaters choose not to participate in boating in year five of the rule (Exhibit M-15). We base regional economic impacts on year-five unmet demand because this represents the highest annual unmet marina slip demand over the five-year period of the rule.
- As noted earlier, we estimate that, on average, boaters in Florida take approximately 60 boating trips per year. Four Florida county-level studies indicate the average number of boating days for boat ramp users and private marina users to range from 54 to 76 days per year (GEC 1999; GEC 2001a; GEC 2001b; GEC 2001c).
- We apply this average to the number of boaters affected, and we estimate that approximately 56,000 trips will not be taken in Florida in year five of the analysis (Exhibit M-15).

EXHIBIT M-15			
Estimate of the Reduced Number of Boat Trips Originating From Marina Slips in Year Five of the Analysis			
Stock	Unmet Year-Five Marina Slip Demand	Average Number of Boating Trips per Year per Boater	Total Trips Lost in Year Five
NW	0	60 days per year	0
USJ	0		0
Atlantic	112		6,720
Southwest	810		48,600
Four Stock Total ^a	922		56,320
^a Totals may not add due to rounding.			

- We use a recent Department of Commerce Report that focuses on the Southeastern US to estimate the average expenditures on each lost boat trip (Gentner *et al.* 2002). This report calculates marine angler trip expenditures for eastern Florida and western Florida in 1999. Focusing only on those expenditures appropriate for boating activities (*i.e.*, excluding bait and ice expenditures), we find eastern Florida expenditures to be approximately \$62 per trip and western Florida expenditures to be approximately \$48 per trip (2001 dollars). We apply the eastern Florida per trip expenditures to the Atlantic and USJ Stocks, and we apply the western Florida per trip expenditures to the NW and Southwest Stocks (Exhibit M-16).

EXHIBIT M-16 Average Expenditures per Boat Trip (2001 dollars)		
	Eastern Florida (Atlantic/USJ)	Western Florida (NW/Southwest)
Transportation	\$4.15	\$2.58
Food	\$15.07	\$12.26
Lodging	\$25.00	\$18.94
Fuel	\$16.83	\$13.50
Access/Boat Launch/Rental	\$1.00	\$0.99
Total ^a	\$62.05	\$48.27
^a Totals may not add due to rounding.		

- We calculate the total decrease in expenditures in each industry in year five of the analysis due to the reduction in boat trips by multiplying the average per-trip expenditures in each stock by the number of trips not taken each year (Exhibit M-17).

EXHIBIT M-17 Total Reduction of Boat Trip Expenditures from Trips Originating at Marina Slips (thousands of 2001 dollars)	
	Four Stock Area
Transportation	\$160
Food	\$700
Lodging	\$1,090
Fuel	\$770
Access/Boat Launch/Rental	\$60
Total ^a	\$2,770
* Totals may not add due to rounding	

- We apply this initial change in expenditures to IMPLAN to estimate the regional economic impact of the decrease in boating trips.

The estimated negative regional economic impact of a reduction in boating trips originating from marina slips is approximately \$4.4 million (Exhibit M-18). The largest impact will be in the Southwest Stock, which will experience a negative regional economic impact of approximately \$3.7 million. In addition, the Atlantic Stock will experience a negative regional economic impact of approximately \$0.7 million.

EXHIBIT M-18 Regional Economic Impact of a Reduction in Boating Trips Originating From Marina Slips for Year Five of the Analysis (millions of 2001 dollars)				
Stock	Direct Effect on Expenditures	Indirect Effect on Expenditures	Induced Effect on Expenditures	Total Regional Economic Impact
NW	\$0	\$0	\$0	\$0
USJ	\$0	\$0	\$0	\$0
Atlantic	\$0.4	\$0.1	\$0.2	\$0.7
Southwest	\$2.3	\$0.5	\$0.9	\$3.7
Four Stock total*	\$2.8	\$0.6	\$1.0	\$4.4
* Totals may not add due to rounding				

Boat Ramp Users

To estimate the regional economic impact associated with the reduction in boat trips from individuals who are unable to find an uncongested boat ramp, we use a methodology similar to the

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estimate of regional economic impact associated with the reduction in boat trips from individuals who are unable to obtain a marina slip.

- We assume that the unmet boat ramp demand for the four stock area corresponds to the number of boaters who take fewer boating trips (Exhibit M-19). For example, at the high end of our estimate range, approximately 1,020 new boaters (12,800 new boat ramp users * 8% additional permit approval rate) would not participate in boating due to capacity constraints in the Atlantic Stock each year.
- We estimate that, on average, boat ramp users in Florida take approximately 32 boating trips per year. Bell (1995) reports several estimates of the average number of boating days per household at boat ramps in Florida. The results range from 24 to 44 days per year, and reflect an average of approximately 32 days per year.
- Under the same assumptions we used to estimate the low- and high-end number of lost boating days for the boat ramp users surplus losses, we estimate that approximately 0 to 522,000 boating trips from boat ramps will not be taken in year five of the analysis (Exhibit M-19).

EXHIBIT M-19					
Estimated Annual Reduction in Boat Ramp Trips					
Stock	Average Number of Boating Trips per Year	Annual Number of New Boat Ramp Users	Recommended Permit Denial Rate	Reduction in Number of Boat Ramp Trips in Year Five Low End	Reduction in Number of Boat Ramp Trips in Year Five High End
NW	32	5,200	0	0	0
USJ		2,100	0	0	0
Atlantic		12,800	8%	0	164,000
Southwest		11,200	20%	0	358,000
Four Stock Total^a		31,200	-	0	522,000
^a Totals may not add due to rounding					

- Under the same assumptions we used to estimate expenditures for marina slip users, we estimate USJ and Atlantic stock boating expenditures to be approximately \$62 per trip and NW and Southwest boating expenditures to be approximately \$48 per trip (Exhibit M-16).
- We calculate the total decrease in expenditures in each industry in year five of the analysis due to the reduction in boat trips by multiplying the average per-trip expenditures in each stock by the number of trips not taken each year (Exhibit M-20).

EXHIBIT M-20 Total Reduction of Boat Trip Expenditures from Trips Originating at Boat Ramps for the Four Stock Area (millions of 2001 dollars)	
Expense Category	Four Stock Area (Low/High)
Transportation	\$0 / \$1.6
Food	\$0 / \$6.9
Lodging	\$0 / \$10.9
Fuel	\$0 / \$7.6
Access/Boat Launch/Rental	\$0 / \$0.5
Total	\$0 / \$27.5

- We apply this initial change in expenditures to IMPLAN to estimate the regional economic impact of the decrease in boating trips.

The estimated negative regional economic impact of a reduction in boating trips originating from boat ramps is between \$0 and \$43.5 million (Exhibit M-21).

EXHIBIT M-21 Regional Economic Impact of a Reduction in Boating Trips Originating from Boat Ramps for Year Five of the Analysis (millions of 2001 dollars)				
Stock	Direct Effect on Expenditures (Low/High)	Indirect Effect on Expenditures (Low/High)	Induced Effect on Expenditures (Low/High)	Total Regional Economic Impact (Low/High)
NW	\$0 / \$0	\$0 / \$0	\$0 / \$0	\$0 / \$0
USJ	\$0 / \$0	\$0 / \$0	\$0 / \$0	\$0 / \$0
Atlantic	\$0 / \$10.2	\$0 / \$2.0	\$0 / \$3.8	\$0 / \$16.0
Southwest	\$0 / \$17.3	\$0 / \$3.7	\$0 / \$6.4	\$0 / \$27.5
Four Stock total	\$0 / \$27.4	\$0 / \$5.7	\$0 / \$10.3	\$0 / \$43.5

Summary of Impacts of Decreased Demand for Marine Goods and Services

In total, reduced recreational boating resulting from restrictions on permitting for new marinas and boat ramps under baseline conditions is expected to result in a negative regional economic impact of \$4 to \$48 million in year five.

Impacts of Decreased Demand for Marine Construction

Under baseline conditions, based on current permitting practices, we estimate that the Service will recommend denial of eight percent of multi-slip watercraft access facility-related permits in the Atlantic and 20 percent in the Southwest Stock. Under baseline conditions, watercraft access facility construction would continue to be restricted in the Atlantic and Southwest Stocks. Based on these existing permitting restrictions, there would be an impact on marine construction expenditures under the baseline conditions.

To estimate the impact on the economy from a reduction in the demand for marine construction, we require information on marine construction revenue. Unfortunately, marine construction revenue is not readily available by county. Moreover, available statewide construction revenue data (NAICS Code 23499, 1997 United States Economic Census), which contains information on marine construction activity, also includes less relevant data on a wide variety of non-marine related heavy construction activity. As a result, these data are likely to overrepresent marine construction activity.

Therefore, we gathered data from a variety of sources to estimate revenue associated with marina slip and ramp construction:

- First, we gathered data on the cost of building marina slips and boat ramps. To do this, we spoke with marine construction companies in Florida.²⁵ The revenue ranges reflect a variety of factors that influence construction costs (2001 dollars). Because the majority of construction projects fall in the middle of these ranges, we select the midpoint to calculate total revenue loss.
 - **Marina Slip: \$4,000 - \$6,000.** Based on our research and on an average size slip of approximately 150 square feet, we estimate the per slip cost to range from \$4,000 to \$6,000.²⁶ The costs vary, depending on the size of the slip, type and extent of amenities, and material used for construction, and economies of scale inherent in building large marinas.
 - **Boat Ramp: \$20,000 - \$25,000.** To estimate the cost of boat ramp construction, we contacted marine construction firms and municipalities. Based on this research, we

²⁵ Specifically, we contacted approximately two dozen marine construction firms based in the four stock area and requested estimates for the revenue associated with dock, marine slip, and boat ramp construction.

²⁶ The actual size of a slip may vary depending across stocks and marinas. The average size of 150 square feet represents the most common size slip.

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estimate the per lane cost of ramp construction to be between \$20,000 and \$25,000.²⁷ The prices for boat ramps are variable and depend on shoreline elevation, length of ramp, required gradient, construction of adjacent parking lot, inclusion of docks for temporary dockage and other grading and sloping of adjoining shoreline.

- Second, we estimate the number of marina slips and boat ramps that would not be built due to existing permitting restrictions but would be needed based on projected demand (Exhibit M-22).
 - **Marina Slips:** As noted in the discussion of “Marina Users’ Surplus Loss” we estimate the number of new marina slips that will not be able to be constructed over the five-year period of the rule (Exhibit M-7). We estimate that approximately 1,240 marina slips would have been permitted annually, and that eight percent and 20 percent of marina slip permits in the Atlantic and Southwest Stocks, respectively, will be recommended for denial.
 - **Boat Ramps:** Bell (1995) estimates the projected demand and supply for boat ramps for Florida’s coastal regions and counties for 1995, 2000, 2005, and 2010. In particular, the study estimates the number of ramp lanes needed over baseline (1992 supply and demand) by county. To estimate the number of boat ramps not built over the five-year period, we first assume that the 2000 boat ramp demand projected in 1992 was fulfilled. Based on this assumption, we then multiply the annual number of estimated ramp lanes needed over the period 2000 to 2005 by five to estimate the total number of boat ramp lanes demanded over the five-year time frame of the analysis. Given current permit denial rates, Exhibit M-22 reports the resulting estimates for the scenario that each boating party uses a boat ramp for 30 minutes per day.²⁸

²⁷ We assume a single lane ramp is 16 feet wide, approximately 65 feet long, and supports an average gradient of 15 percent.

²⁸ Note that the 30-minute use assumption represents the study’s mid-point estimate of the total time required to launch and retrieve recreational watercraft, including some waiting time (*i.e.*, it assumes that access is not instantaneous). Under this assumption, during a 12-hour day, an average of 36 boats could use a single-lane ramp.

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EXHIBIT M-22					
Annual Unmet Marine Construction Demand					
Stock	Annual Marina Slip Demand	Annual Boat Ramp Demand	Permit Approval Rate	Unmet Annual Marina Slip Demand	Unmet Annual Boat Ramp Demand
NW	90	3	0 %	0	0
USJ	60	0	0 %	0	0
Atlantic	280	15	92%	22	1
Southwest	810	9	80%	162	2
Four Stock total	1,240	27	-	184	3

- Applying the cost of building a marina slip or boat ramp to the projected demand for these marine access facilities, we estimate the total revenue likely to be lost to the marine construction industry. We estimate this reduction in construction revenues to be approximately \$990 thousand annually (Exhibit M-23).

EXHIBIT M-23			
Marine Construction Annual Revenue Loss			
(thousands of 2001 dollars)			
Stock	Marina Slip Revenue	Boat Ramp Revenue	Total^a
NW	\$0	\$0	\$0
USJ	\$0	\$0	\$0
Atlantic	\$112	\$27	\$139
Southwest	\$810	\$41	\$851
Four Stock Total^a	\$922	\$68	\$990
^a Totals may not add due to rounding			

We estimate that there would be a reduction in direct economic activity of approximately \$990,000 (Exhibit M-23). This change in expenditures would ripple through the economy, leading to a number of indirect and induced effects (Exhibit M-24). We estimate that the decline in revenues of industries indirectly linked to marine construction is likely to lead to the reduction of approximately \$413,000 in expenditures. In addition, we estimate that the changes in direct and indirect expenditures would lead to a decline of approximately \$405,000 in household consumption (induced effects). Thus, under baseline conditions, the total negative impact of permitting restrictions on marine construction in the study area would be approximately \$1.8 million. The annual impact for this category is expected to be constant over the five year period of the rule, thus annual impacts also represent year-five impacts.

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We also use IMPLAN to calculate the change in net employment. This analysis shows that there would be a loss of approximately 18 jobs from the direct, indirect, and induced effects of limiting marine construction due to current permitting restrictions continuing in the study area under baseline conditions.

EXHIBIT M-24 Annual Regional Economic Impact of a Reduction in Marine Construction Expenditures (Thousands of 2001 dollars)				
Stock	Direct Effect on Expenditures	Indirect Effect on Expenditures	Induced Effect on Expenditures	Total Regional Economic Impact
NW	\$0	\$0	\$0	\$0
USJ	\$0	\$0	\$0	\$0
Atlantic	\$139	\$56	\$56	\$252
Southwest	\$851	\$357	\$349	\$1,556
Four Stock total	\$990	\$413	\$405	\$1,808
^a Totals may not add due to rounding				

We estimate that the largest impact of a reduction in marine construction activity under baseline conditions would be in the Southwest Stock, where there would be a reduction of approximately \$1.6 million in economic activity, and a reduction of approximately 15 jobs. Under baseline conditions, there would also be a small impact on the Atlantic Stock. In the Atlantic Stock, we estimate that a reduction in marine construction activity would lead to a negative regional economic impact of approximately \$250,000. This would also lead to the reduction of approximately two jobs.

Regional Economic Impact Summary

In summary, current permitting restrictions would lead to a negative regional economic impact of between \$4.4 million to \$47.8 million in year five due to a decrease in the revenues of the marine recreation industry and \$1.8 million due to a decrease in the revenue of the marine construction industry in year five of the rule. Under baseline conditions, a total negative regional economic impact of between \$6.2 million to \$49.7 million is expected in year five.

II. ECONOMIC ANALYSIS OF ALTERNATIVE 2

Introduction

Alternative 2 represents the following situation:

- The Service would authorize incidental take of manatees in the NW, USJ and Atlantic Stocks;
- The NW and USJ Stocks would meet the negligible impact standard, and no mitigation measures would be required in these stocks;
- The level of take in the Atlantic and Southwest Stocks would not meet the negligible impact standard, and the Service would not authorize incidental take in these stocks.

Alternative 2 would be expected to result in the following types of incremental economic impacts:

- *Administrative Costs:* This category represents costs associated with agency administration efforts related to the Letter of Authorization (LOA) process and associated mitigating measures. These costs to agencies are expected to be minimal.

These incremental impacts are discussed below.

Analysis of Incremental Impacts

The only incremental economic impacts associated with Alternative 2 would result from increased administrative activities related to issuing LOAs, which are assumed to have a minimal economic impact, as discussed below. Otherwise, manatee protection efforts would not change under Alternative 2.

Under Alternative 2, the Service would be able to issue LOAs covering agency activities in the NW and USJ Stocks. Agencies that are involved in the LOA process would incur incremental economic impacts. The affected agency administrative efforts would be as follows:

- LOA Application: Major and minor agencies could apply for LOAs. This would require the agencies to gather information and work with the Service to structure the LOA conditions. “Major” LOA applicants would be expected to include: the Service, the Corps, USCG, and the State of Florida. “Minor” applicants could include NPS, NOAA, and USGS. The application process would likely only cause minimal impacts on applicant agencies.

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- LOA Review: The Service would review LOA application and structure appropriate LOA. The Service would evaluate each LOA after one-year and reauthorize it if appropriate. The Service estimates that they would need to hire one additional full-time staff to process LOAs.²⁹
- LOA Reporting Requirements: Each agency receiving an LOA would be required to submit a report of all activities conducted pursuant to the LOA annually. Specific reporting requirements under the LOAs would vary depending on the applicant agency and the scope of activities being authorized. However, the reporting process would likely only cause minimal impacts on applicant agencies.

Under Alternative 2, the agencies involved in the LOA process would likely experience only minimal impacts as a result of increased administrative activities related to LOA application, review, and reporting requirements. The Service would experience somewhat higher impacts, because they will be in charge of LOA issuance and annual review. These administrative costs would be the only incremental impacts associated with Alternative 2.

III. ECONOMIC ANALYSIS OF ALTERNATIVE 3

Introduction

Alternative 3 represents the following situation:

- The Service would authorize incidental take of manatees in the NW, USJ and Atlantic Stocks;
- The NW and USJ Stocks would meet the negligible impact standard, and no mitigation measures would be required in these stocks;
- The Atlantic Stock would require mitigating measures in order for the Service to be able to authorize incidental take in that stock; and,
- The Service would not authorize incidental take in the Southwest Stock.

²⁹USFWS 2002g.

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Alternative 3 would have several types of incremental impacts. The incremental impacts that would be associated with this alternative in the NW and USJ Stocks would result from increased administrative activities associated with issuing LOAs. In addition, due to the implementation of the mitigating measures expected under this alternative, the Service would be able to concur with some watercraft access facility permits for which it was otherwise unable to concur. As a result, some incremental economic benefits would be expected in the Atlantic Stock under this alternative.

Specifically, Alternative 3 results in the following types of incremental economic impacts:

- *Administrative Costs:* This category represents costs associated with agency administration efforts related to the Letter of Authorization process and associated mitigating measures. These incremental costs to agencies are similar to those discussed in Alternative 2 and are expected to be minimal.
- *Consumer Surplus Effects:*³⁰ Based on a change in the Service's ability to recommend approval of permits under Alternative 3, the analysis considers incremental economic benefits associated with increased recreational boating opportunities resulting from increased access to the water.
- *Regional Economic Impacts:*³¹ Because this alternative would allow for the construction of additional marine access facilities, the analysis estimates secondary effects on the Florida economy that would result from increased expenditures in the marine industry. First, an increase in marine access points is likely to result in an increase in recreational boating activity. This increase in boating activity is likely to lead to increased demand for marine retail sales, such as boats, clothing, general marine merchandise, and other related goods and services. Second, lifting restrictions on the authorization and construction of such facilities as marinas and boat ramps is likely to result in additional demand for marine construction services.

The incremental economic impacts expected under Alternative 3 are first summarized, and then discussed in detail below. The baseline economic impacts against which the incremental impacts of Alternative 3 are measured were discussed in Section I of this Appendix.

³⁰Surplus is generally a measure of overall economic welfare and is conceptually based on the principle that some consumers benefit at current prices because they are able to purchase goods and services at a price that is less than their total willingness to pay for the good. For example, boaters may incur consumer surplus benefits when boat ramps are less congested because their enjoyment of the boating experience increases.

³¹Regional economic impact estimates are independent from surplus estimates and cannot be added to obtain a single value.

Summary of Incremental Impacts

The incremental economic impacts that would exist under Alternative 3 are summarized below and in Exhibit M-25.

Administrative Costs

- **Agency Administrative Efforts.** Under Alternative 3, some minimal incremental costs are expected to result from the administrative activities related to LOA application, review, and reporting requirements, and mitigating measures. The Service would experience somewhat higher costs, because they would be in charge of LOA issuance and annual review. While not quantified, these incremental administrative costs would be minimal.

Consumer Surplus Benefits

Under this alternative, the Service may be able to authorize additional construction of watercraft access facilities, such as marinas and boat ramps, beyond the levels currently permitted. This is expected to result in the following surplus benefits:

- **Marina Users:** Due to additional permit approvals, new marina construction is expected to result in additional watercraft facility access to meet projected demand. This would result in an economic benefit of approximately \$600,000 to \$700,000 over the five-year period of the rule. This benefit would reduce negative surplus effects in the baseline by 12 percent.
- **Boat Ramp Users:** Due to an increased approval rate for permits for boat ramp construction, some boaters would incur surplus benefits associated with additional access. This benefit may range from zero to approximately \$17.6 million over the five-year period. This benefit would reduce negative surplus effects in the baseline by up to 31 percent.

Total consumer surplus benefits for both marina users and boat ramp users under Alternative 3 would be approximately \$0.6 to \$18.3 million over the five year period of the rule. Alternative 3 would reduce negative surplus effects in the baseline by 12 to 29 percent.

Regional Economic Impacts

This alternative would also be likely to affect income and employment in various sectors of the marine industry and marine construction industry. Impacts to these sectors would, in turn, result in indirect effects on the broader economy.

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- **Marine Goods & Services.** Additional authorization and construction of watercraft access facilities would lead to an increase in recreational boating activity, which would increase the demand for goods and services related to marine recreation. In year five of the rule, we estimate that this would lead to an economic benefit ranging from \$0.4 to \$10.6 million in the sales of marine related goods and services, and that this initial change in expenditures would lead to a positive regional economic impact ranging from \$0.7 to \$16.7 million. This positive regional economic impact would reduce negative baseline impacts by 15 to 35 percent in year five of the rule.
- **Marine Construction Industry.** An increase in the authorization and construction of watercraft access facilities would also lead to an increase in the revenues of the marine construction industry. We estimate that there would be a positive initial annual impact of \$0.14 million on this sector, and a total positive regional economic impact of \$0.25 million each year. This positive regional economic impact would reduce negative baseline regional impacts by 14 percent each year. The annual impact for this category is expected to be constant over the five year period of the rule, thus annual impacts also represent year-five impacts.

Thus, Alternative 3 would lead to a positive regional economic impact of between \$0.7 million and \$16.7 million due to an increase in the revenues of the marine recreation industry and \$0.3 million due to an increase in the revenue of the marine construction industry, for a total positive regional economic impact of between \$1 million and \$17 million in year five of the rule.³² Overall, the positive regional economic impact expected under Alternative 3 would reduce negative baseline regional impacts by 15 to 34 percent.

Additional breakdown of the incremental economic impacts under this alternative is provided in Appendix L, which provides a year-by-year summary of nominal impacts by category and stock for the five-year period of the rule.

³²Regional economic impact estimates are independent from surplus estimates and cannot be added to obtain a single value.

EXHIBIT M-25 Summary of Economic Impacts Under Alternative 3 (millions of 2001 dollars)					
	NW	USJ	Atlantic	Southwest	Total
Administrative Costs	Minimal incremental administrative costs associated with the issuance of Letters of Authorization and mitigating measures. These costs have not been quantified.				
Consumer Surplus Benefits <i>(Present Value Total)</i>					
Marina Users	\$0	\$0	\$0.6 - \$0.7	\$0	\$0.6 - \$0.7
Boat Ramp Users	\$0	\$0	\$0 - \$17.6	\$0	\$0 - \$17.6
Subtotal	\$0	\$0	\$0.6 - \$18.3	\$0	\$0.6 - \$18.3
Positive Regional Economic Impacts^a <i>(Year-Five Totals)</i>					
Marine Goods & Services	\$0	\$0	\$0.7 - \$16.7	\$0	\$0.7 - \$16.7
Marine Construction	\$0	\$0	\$0.3	\$0	\$0.3
Subtotal	\$0	\$0	\$0.9 - \$16.9	\$0	\$0.9 - \$16.9
^a Regional economic impact estimates are independent from surplus estimates and cannot be added to obtain a single value.					

Limitations of Analysis

It is important to recognize the uncertainty inherent in the assumptions underlying this analysis. There are a number of factors that may lead us to under- or overestimate economic benefits. In particular, we may understate economic benefits based on the following assumptions.

- The analysis does not account for growth in out-of-State boaters using Florida waters. These new boaters may be affected by this rulemaking; however, given the limited data available on these boaters, they could not be included in the analysis.
- Historical permitting rates are assumed to continue into the future. Given the growth in Florida, this assumption may lead us to understate economic benefits resulting from increased permit approval rates.

In addition, we may overstate economic benefits based on the following assumptions.

- The analysis assumes that there is an unmet demand for watercraft access facilities because of capacity constraints under baseline conditions. In some cases, there may be available capacity; if this is the case, this assumption will lead us to overstate economic benefits. In addition, we assume that demand cannot be met outside of the region. Our analysis does not

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allow for the fact that marinas and boat ramps are geographically located in areas that may not coincide with demand. These assumptions may lead us to overstate economic benefits.

- The IMPLAN model that is used to estimate regional economic impacts is a static model and does not account for the fact that the economy will adjust. IMPLAN measures the effects of a specific policy change at one point in time. Over the long-run, the economic benefits predicted by the model may be overstated as adjustments occur.
- The analysis assumes that there are no available substitutes. For example, in the case of boat ramp users, we assume that if boat ramps are too congested, some boaters stop boating. In reality there may be other available substitutes such as borrowing a neighbor's vacant dock or mooring. Our assumption of no available substitutes may lead us to overstate economic benefits.

Certain assumptions may affect our estimate of economic impact; however, we have no way to determine the direction of impact due to the following assumptions.

- The analysis assumes additional boaters will go boating under various scenarios. However, there is no model available to estimate boaters' response to a change in supply of watercraft access facilities.
- The analysis utilizes data from various previous studies. Given the timing required for completion of this analysis, we were unable to collect primary data on which to base the analysis. Without current data collection for comparison, it is difficult to estimate whether our analysis may be over- or understated because of potential biases in our secondary data sources.
- The IMPLAN model that is used to estimate regional economic impacts relies on 1998 data, the most recent data available. If significant changes have occurred in the structure of Florida's economy, our results may be sensitive to this assumption. The direction of any such bias is unknown.

Exhibit M-26 summarizes factors that may affect our economic impact estimates.

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EXHIBIT M-26 SUMMARY OF FACTORS AFFECTING ECONOMIC IMPACTS			
Impact Category	Description of Impact	Uncertainty or Other Factor Affecting Accuracy of the Economic Impact Estimate	Direction of Potential Bias
<i>Administrative Costs</i>			
Agency Administrative Efforts	Incremental costs of rule including application for and issuance of Letters of Authorization.	Additional administrative efforts due to the rule have not been quantified.	Underestimate
Development and Enforcement of MPAs, Education and Outreach, Permitting Efforts, and Additional Manatee Conservation Efforts	Incremental costs related to mitigating measures associated with issuing Letters of Authorization.	Mitigating measures are not specified until LOAs are issued; therefore these incremental costs could not be quantified.	Underestimate
<i>Consumer Surplus Benefits</i>			
Marina Users	Surplus impacts incurred because new boaters will be able to rent marina dock slips and choose to go boating.	Historical marina slip permitting rates are assumed to continue into the future.	Underestimate
		Information on watercraft access facility substitution not available. Assumes new boat registrants who are able to obtain a marina slip would otherwise have chosen to stop boating. Other available substitutes may have been available, such as borrowing a vacant dock, mooring, etc.	Overestimate
		Dry storage capacity information not available. Marinas may increase dry storage capacity in response to increased demand instead of constructing additional slips.	Overestimate
		Historical marina slips permitted may not reflect future unmet marina demand. Assumes permitted slips are built and utilized. Also, marinas may apply for permits in the absence of demand.	Overestimate

EXHIBIT M-26 SUMMARY OF FACTORS AFFECTING ECONOMIC IMPACTS			
Impact Category	Description of Impact	Uncertainty or Other Factor Affecting Accuracy of the Economic Impact Estimate	Direction of Potential Bias
Boat Ramp Users	Impacts incurred because newly registered boaters will be able to access boat ramps and will choose to go boating.	Information on watercraft access facility substitution not available. Assumes that once boat ramps are less congested, boaters will choose to go boating who would otherwise not have.	Overestimate
		Range of impacts reflects uncertainty regarding when boat ramp capacity will be reached (<i>e.g.</i> , parking space occupancy and ramp capacity are unknown).	Overestimate
		Uncertain at what level individuals perceive boat ramp congestion as too great to continue with the activity.	Uncertain
		Assumes that boat ramps are currently filled up to capacity. Boat ramps are geographically located in areas that may not coincide with demand. If there is available capacity, the analysis will overstate impacts. If not, the analysis may understate impacts.	Uncertain
		Information on growth of out-of-state boaters using Florida boat ramps is not available.	Underestimate
Regional Economic Impacts			
Marine Goods and Services	Impacts represent the regional economic impacts resulting from an increase in boating trips because of additional capacity.	Historical marina slip and boat ramp permitting rates are assumed to continue into the future.	Underestimate
		Historical marina slips permitted may not reflect future marina demand. Assumes permitted slips would be built and utilized. Also, marinas may apply for permits in the absence of demand.	Overestimate
		Increased demand for dry storage capacity may offset some of the marine goods and services benefits associated with increased dock and marina slip usage.	Overestimate

EXHIBIT M-26 SUMMARY OF FACTORS AFFECTING ECONOMIC IMPACTS			
Impact Category	Description of Impact	Uncertainty or Other Factor Affecting Accuracy of the Economic Impact Estimate	Direction of Potential Bias
Marine Construction	Impacts represent the regional economic impacts resulting from a change in marine construction.	Historical permitting rates are assumed to continue into the future.	Underestimate
		Historical permitting data may not reflect future construction demand. Assumes permitted marina slips would be built.	Overestimate

Administrative Costs

Under Alternative 3, the Service would be able to issue Letters of Authorization (LOAs) covering agency activities in the NW, USJ, and Atlantic Stocks. The incremental economic impact associated with administrative costs under this alternative would result from agency activities related to the issuance of LOAs. These incremental impacts are assumed to have a minimal economic impact, as discussed below.

Agency Administrative Efforts

The affected agency administrative efforts for this alternative would be the following:

- **LOA Application:** Major and minor agencies may apply for LOAs. This would require the agencies to gather information and work with the Service to structure the LOA conditions. “Major” LOA applicants are expected to include: the Service, the Corps, USCG, and the State of Florida. “Minor” applicants may include NPS, NOAA, and USGS. The application process will likely only cause minimal impacts on applicant agencies.
- **LOA Review:** The Service would review LOA applications and structure appropriate LOAs. The Service would evaluate each LOA after one-year and reauthorize it if appropriate. The Service estimates that they would need to hire one additional full-time staff to process LOAs.³³
- **LOA Reporting Requirements:** Each agency receiving a LOA would be required to submit a report of all activities conducted pursuant to the LOA annually. Specific reporting requirements under the LOAs would vary depending on the applicant agency and the scope of activities being authorized. However, the reporting process would likely only cause minimal impacts on applicant agencies.

The agencies involved in the LOA process would likely experience only minimal incremental impacts as a result of increased administrative activities related to LOA application, review, and reporting requirements. The Service would experience somewhat higher impacts, because they would be in charge of LOA issuance and annual review.

³³USFWS 2002g.

Administrative Costs Affected by Mitigating Measures

This alternative could also have an incremental impact associated with administrative costs such as: development and enforcement of manatee protection areas; education and outreach; permitting efforts; and additional manatee conservation efforts. Given the level of effort being expended under existing conditions, any mitigating measures are not likely to result in significant incremental economic impacts. Until specific LOAs are issued, these incremental impacts cannot be quantified.³⁴

Consumer Surplus Benefits

Under Alternative 3, there would be some incremental benefits to recreationists due to the Service's ability to concur with multi-slip permits in the Atlantic region. The Service expects that it would be able to recommend approval of additional multi-slip watercraft access facility permit applications in the Atlantic Stock under Alternative 3. Under this alternative, some boat owners who would have otherwise been unable to utilize marina facilities or boat launches may be able to access these facilities, due to additional capacity (or reduced price due to increased supply of these facilities). These boat owners may choose to recreate more often. This analysis assumes that as watercraft access increases, some additional boaters would be able to obtain access, thus increasing the total number of boat trips that would have been taken.

Boating use of Florida waters has increased 42 percent since 1993. In 2001, 943,611 vessels were registered in the State of Florida.³⁵ The Florida Department of Community Affairs estimates that, in addition to boats belonging to Florida residents, between 300,000 and 400,000 boats registered in other states use Florida waters each year. Recreational boating activity in the four stocks comprises the majority of total Statewide activity (Exhibit M-27). For example, nearly 85 percent of all Florida registered boats were registered in counties included in this study.

³⁴USFWS 2002g.

³⁵ Total registered boats in the State include commercial, dealer, and recreational vessels. On average, recreational boats represent 95 percent of all registered vessels (source: Analysis of State of Florida Department of Safety and Highway Vehicles Boating Registration Statistics for 2001).

EXHIBIT M-27			
Florida Boating Registrations in the Study Area^{a,b}			
Stock	1999	2000	2001
NW	114,728	117,294	130,184
USJ	61,991	61,512	68,188
Atlantic	288,188	300,979	326,565
Southwest	231,594	243,075	265,177
Four Stock Total	696,501	722,860	790,114
^a Florida Department of Safety and Highway Vehicles 2002.			
^b Boat registration figures include commercial, dealer, and recreational boats. Therefore, these figures may overestimate the affected population for the purpose of this analysis. However, recreational boats general represent 95 percent of the total boat registrations in the State (based on 2001 data).			

Numerous facilities serve the recreational and commercial boating communities. Boaters mainly rely on public and private marinas, residential docks (single family, multi-family), and boat ramps. Nearly two-thirds of all Florida boaters use boat ramps in both the coastal and noncoastal counties (Bell 1995).

Under existing conditions, the Service is currently recommending approval of all residential (single-family) watercraft access permit applications and approximately 92% of multi-slip permit applications in the Atlantic Stock.³⁶ Analysis of existing data indicate that existing capacity will not handle all of the expected demand for marina slips over the five-year period of the rule. Under Alternative 3, it is expected that the Service would no longer recommend denial of multi-slip permits in the Atlantic Stock. Specifically, this would lead to approval of an additional eight percent of marina slip and boat ramp permit applications in the Atlantic Stock. These additional marina slips and boat ramps would likely result in incremental consumer surplus benefits. The remainder of this section presents our analysis of these consumer surplus benefits.

Consumer Surplus Benefits to Marina Users

Under Alternative 3, due to a change in permitting restrictions, some boaters in the Atlantic Stock who would otherwise be unable to use marinas because of capacity constraints may be able to obtain marina access. Assuming that all current marina slip renters continue to rent marina slips, new demand is likely to reach and surpass current available capacity, especially in areas with little current excess capacity. Therefore, any additional capacity is likely to result in surplus benefits.

We expect that marina capacity could become an issue for boat users under baseline conditions based on our research of boating facility capacity. In one study (Bell 1990), the author found that

³⁶In 2001-2002, in the Atlantic Stock, four multi slip permits (eight percent) have been held compared to 49 multi-slip permits considered (USFWS 2002h, Unpublished FWS data).

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Florida saltwater marinas would not be able to satisfy future boater demand because of a variety of environmental constraints on slip expansion as well as land competition. A variety of sources, including Manatee Protection Plans, Boating Activity Studies, Boating Facility Plans, and other official policy documents indicate that average occupancy estimates throughout the year provided by individual counties range from approximately 50 to 90 percent. Occupancy estimates fluctuate seasonally and are generally higher during the peak winter months (January to March).³⁷

The development of occupancy estimates and the date of the most recent estimate varies from county to county. For example, some counties relied on academic studies that surveyed marina owners to compile a countywide inventory. Other counties made field visits to marina facilities and compiled information on the number of slips and the current (*i.e.*, at the time of the study) or average occupancy rate. Some counties examined a subsample of marinas to develop a county-wide estimate. Note that while most counties relied on past boating studies, others developed primary data through recent inventory work. The majority of these studies were conducted in the mid 1990's. We would expect marina slip occupancy to have grown since that time, as boater registration has continued to grow. Appendix K describes these reports.

Under Alternative 3, because additional marina permits would be granted and capacity increased, we assume that there would be an increase in boating activity. To estimate the extent of additional marina slip capacity due to additional marina slip permit approvals, we obtained historical permitting information from the Corps.

- The Corps' permitting data indicate that the number of marina slips permitted have fluctuated over the years (Exhibit M-28).

³⁷ We recognize that occupancy levels may vary significantly by county and by season. For example, marina occupancy in Naples is at or near 100 percent and generally includes a waiting list. In the Tampa-St. Petersburg area occupancy varies, but is generally below 100 percent. Several public comments provided occupancy data that fit within the range of occupancy rates utilized in the analysis. Specifically, one comment indicated that occupancy of wet slips in Lee County may vary from 40-60% in the summer to 100% in winter (Riley 2003). In addition, the most recent inventory of Duval County marinas indicated an average occupancy rate of 87% for wet slips for 2001-2002 (Jacksonville University 2002).

EXHIBIT M-28					
Annual Marina Slips Permitted					
Stock	1998	1999	2000	2001	2002
NW	20	0	0	0	90
USJ	40	40	60	50	10
Atlantic	280	210	220	120	110
Southwest	30	810	30	230	740
Four Stock Total ^a	360	1,060	300	400	950
^a Totals may not add due to rounding					

- Given the fluctuation in marina slips permitted over the past five years, we assume that for each stock, future permit requests reflect the highest annual number of slips permitted from this five-year period. For example, for the NW Stock, we assume the annual number of future marina slips permitted to be 90 (Exhibit M-29).

EXHIBIT M-29	
Projected Annual Marina Slips Permitted	
Stock	Annual Demand
NW	90
USJ	60
Atlantic	280
Southwest	810
Four Stock Total	1,240

- The expected increase in marina slips permitted is used as an approximation of marina slip demand growth. We calculate the five-year marina slip demand growth as an accumulation of demand across the five-year period of the rule (Exhibit M-30). That is, marina slip users who are able to obtain a slip in year one, continue to have a demand for that slip in years two through five, because the additional slips are available during all of those years. Similarly, marina slip users who were able to obtain a slip in year four continue to have demand for that slip in year five.
- Based on the assumption that the Service will recommend approval of an additional eight percent of permit applications for the Atlantic Stock under Alternative 3, we estimate that over the five-year period 340 additional marina slips will be permitted. To calculate the five-year economic surplus benefit, we assume that approximately 340 additional boaters will be able to rent a marina slip over the five-year period (Exhibit M-30).

EXHIBIT M-30 Estimate of Additional Marina Slip Demand for Five-Year Period of Regulation			
Stock	Projected Annual Slip Demand	Additional Permit Approval Rate	Additional Five-Year Marina Slip Demand (i.e., Cumulative)
NW	90	0%	0
USJ	60	0%	0
Atlantic	280	8%	340
Southwest	810	0%	0
Four Stock Total	1,240	--	340

To estimate the economic surplus benefit associated with additional capacity at marinas, we apply a boating value surplus estimate to the estimate of additional five-year marina slip demand (Exhibit M-31). We assume that with additional capacity, boaters who were previously unable to obtain marina slips will now choose to go boating. The economic surplus benefit for these boaters is the willingness to pay for a day of boating, applied to the number of additional boating trips.

The economic valuation literature provides a few studies that are appropriate to apply to the additional boating days for marina slip users in Florida. In particular, three studies provide an average boating surplus estimate of \$40 per day (2001 dollars) (Bhat *et al.* 1998; Bergstrom and Cordell 1991; Walsh *et al.* 1992).³⁸ These studies are discussed in Section I of this Appendix.

We apply this value estimate to the approximate number of additional boating days due to increased marina slip capacity. We estimate that, on average, boaters in Florida take approximately 60 boating trips per year. Four Florida county-level studies indicate the average number of boating days for boat ramp users and private marina users range from 54 to 76 days per year (GEC 1999; GEC 2001a; GEC 2001b; GEC 2001c). The benefits to these boaters is the willingness to pay for a boating day multiplied by additional slip demand over the five-year period and the estimated number of boating trips taken per year.

The surplus benefit to marina users over the five-year period ranges from \$630,000 to \$720,000 (Exhibit M-31). These figures are discounted using a 3 and 7 percent discount rate. This benefit would reduce negative surplus effects in the baseline by 12 percent.

³⁸While a study of surplus user values exists for the Florida Keys/Key West area (Leeworthy and Bowker 1997), this report does not provide a value that is appropriate to apply to our analysis. This report estimates an aggregate value for a user-day of activities that may include such recreation types as snorkeling, scuba diving, boating, fishing, windsurfing, and museuming. This study does not provide a recreation-type specific value for each activity. The authors assume that within this aggregate value, each activity has the same value.

EXHIBIT M-31 Five-Year Impact for Additional Marina Slip Demand			
Stock	Additional Five-Year Marina Slip Demand (i.e., Cumulative)	Five-Year Economic Surplus Benefit (thousands of 2001 dollars)	
		3% Discount Rate	7% Discount Rate
NW	0	\$0	\$0
USJ	0	\$0	\$0
Atlantic	340	\$720	\$630
Southwest	0	\$0	\$0
Four Stock Total	340	\$720	\$630

Consumer Surplus Benefits to Boat Ramp Users

Under Alternative 3, some boaters who were otherwise unable to use boat ramps because of capacity constraints may be able to obtain boat ramp access. In addition, the quality of the boat ramp experience may increase as a result of increased capacity. This section estimates the economic surplus benefits that would accrue to boat ramp users under this alternative.

A 1995 Statewide boat ramp study (Bell 1995) notes that boat ramp capacity constraints are likely to be reached without the construction of new facilities. In particular, this study suggests that “the current [*i.e.*, 1995] and possibly potential supply of coastal boat ramps will be inadequate to accommodate present and future boater demand for these facilities in many, if not all, of Florida’s 35 coastal counties” (Bell 1995, p. 1). The results of this study also show that, depending on the assumptions of the time needed to launch and retrieve a boat at a boat ramp, the majority of counties will need more boat ramp lanes than were available in 1992.

With approximately two-thirds of the Florida boater population relying on boat ramps, an estimated 31,200 new boaters will choose to use boat ramps each year, as shown below.

- Recreational boating registration in the four stocks grew by approximately 93,600 for the two-year period between 1999 and 2001 (Exhibit M-27). Thus, approximately 46,800 additional boats require access to Florida’s marine resources each year.³⁹ Using the boat registration trend data from 1999 through 2001, we estimate that future registration growth will reflect historical registration increases (Exhibit M-32).

³⁹Limited data are available for estimating impacts to out-of-state boaters who use Florida waters. These types of boaters are accounted for in our discussion of capacity constraints, however we are unable to forecast growth in demand for these boaters to estimate an out-of-state boater economic surplus impact.

EXHIBIT M-32 Approximate Annual Growth in Boat Registration by Stock (Based on 1999 - 2001 data)	
Stock	New Boat Registrations
NW	7,700
USJ	3,100
Atlantic	19,200
Southwest	16,800
Four Stock Total	46,800

- We estimate that approximately two-thirds of Florida boaters use boat ramps to access the water (Bell 1995). Based on our data, approximately 31,200 of the 46,800 new boat registrations would seek boat ramp access over marina slip rental (Exhibit M-33).

EXHIBIT M-33 Approximate Annual Growth in Ramp Users by Stock	
Stock	Ramp Users
NW	5,200
USJ	2,100
Atlantic	12,800
Southwest	11,200
Four Stock Total*	31,200
*Totals may not add due to rounding.	

Currently, boat ramp facilities in some Florida counties are not sufficient to meet current demand; however, specific data describing the current congestion levels at boat ramps across the state are limited. County boating plans generally do not identify user trends at boat ramps or identify current levels of congestion. One exception, Collier County, indicates some level of existing congestion at specific ramps, noting that parking lots frequently fill to capacity during peak periods, such as weekends and holidays. While there were some planned expansions and new docks in the county, no updated information on boat ramp construction is available (Collier County Natural Resources Department 1995).

Under Alternative 3, it is expected that the Service would be able to ease restrictions on boat ramp construction activity in the Atlantic Stock over the five-year period of the rule. This would likely allow for additional boating activity in counties that are currently capacity constrained. We estimate economic surplus benefits to boat ramp users based on information on projected growth in boat ramp usage, existing capacity, and estimates of boating values:

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- We assume that counties have built a sufficient number of ramps throughout the four stocks area to meet the 2000 demand predicted by Bell's study. Further, we assume that the five-year demand Bell projects from 2000-2005, is equivalent to the increased demand for the five-year period of the rule. We assume that prior to this proposed regulation, the construction industry has been able to respond to this projected demand.
- Assuming that all current boat ramp users continue to use boat ramps, we estimate the growth in boat ramp usage to be approximately 31,200 users annually (Exhibit M-33).
- To estimate the growth in the annual number of boat ramp-initiated boating trips, we apply Bell's 1995 estimate of 32 boating days per year to our estimate of boat ramp growth. In this study, Bell reports several estimates of the average number of boating days per household at boat ramps in Florida. The results range from 24 to 44 days per year, and reflect an average of approximately 32 days per year. The estimate of boating days per year is slightly lower than the assumption used regarding marina users (i.e., 60 days). However, based on the time and effort required to trailer boats to boat ramps, it is reasonable to assume that fewer recreational boating days are associated with boat ramp access than with marina slip users.
- We provide a range of surplus benefit estimates based on assumptions about the additional number of boat ramp-initiated trips attributable to the proposed rule, as follows:
 - The high end range (Exhibit M-34) represents the maximum possible surplus benefit by assuming that additional boat ramp users are able to obtain access at local boat ramps due to capacity added as a result of the rule. This range likely overestimates the actual surplus benefits, as some of these ramp users may have been likely to travel longer distances to find less congested ramps, or may simply have reduced – rather than completely eliminated – their recreational boating activity under existing conditions.
 - We assume that under the low range scenario, the projected increases in ramp congestion will not affect the user population and therefore there will be no impact attributable to the proposed rule.
- As with the surplus benefit associated with marina users, we calculate the five-year increase in number of boat trips as an accumulation of demand across the five year period of the rule (Exhibit M-34). That is, boat ramp users who are able to use ramps in year one, also are able to use ramps in years two through five. Similarly, boat ramp users who are able to use ramps in year four return to ramps in year five.

EXHIBIT M-34 Estimated Annual Increase in Boat Ramp Days					
Stock	Average Annual Number of Boat Ramp Trips	Annual Number of New Boat Ramp Users	Additional Permit Approval Rate	Five-Year Increase in Number of Boat Ramp Trips Low End (i.e., Cumulative)	Five-Year Increase in Number of Boat Ramp Trips High End (i.e., Cumulative)
NW	32	5,200	0%	0	0
USJ		2,100	0%	0	0
Atlantic		12,800	8%	0	491,000
Southwest		11,200	0%	0	0
Four Stock Total		31,200	-	0	491,000

- We estimate an economic surplus value for a day of motorized boating from an average of three studies, as described in the previous section. We estimate this value to be approximately \$40 per day applied to the five-year increase in boat ramp trips (2001 dollars).

Applying the economic surplus value for a day of motorized boating (\$40) to the average annual increase in boat ramp trips we estimate economic surplus benefit for boat ramp users. The present value surplus benefit over the five-year period ranges from zero to \$17.6 million (Exhibit M-35). These figures are discounted using a three and seven percent discount rate. This benefit would reduce negative surplus effects in the baseline by up to 31 percent.

EXHIBIT M-35 Surplus Benefit to Boat Ramp Users (millions of 2001 dollars)					
Stock	Five-Year Increase in Number of Boat Ramp Trips	Five-Year Economic Surplus Benefit			
		3% Discount Rate		7% Discount Rate	
		Low	High	Low	High
NW	0 / 0	\$0	\$0	\$0	\$0
USJ	0 / 0	\$0	\$0	\$0	\$0
Atlantic	0 / 491,000	\$0	\$17.6	\$0	\$15.4
Southwest	0 / 0	\$0	\$0	\$0	\$0
Four Stock Total^a	0 / 491,000	\$0	\$17.6	\$0	\$15.4
^a Totals may not add due to rounding					

Summary of Consumer Surplus Benefits

Under Alternative 3, the surplus benefit to marina users over the five-year period ranges from \$0.6 to \$0.7 million (Exhibit M-31). The present value surplus benefit to boat ramp users over the five-year period ranges from zero to \$17.6 million (Exhibit M-35). These figures are discounted using a three and seven percent discount rate. Total consumer surplus benefits for both marina users and boat ramp users under Alternative 3 would be approximately \$0.6 to \$18.3 million over the five year period of the rule. Alternative 3 would reduce negative surplus effects in the baseline by 12 to 29 percent.

Regional Economic Impacts

This section discusses the incremental positive regional economic impacts expected under Alternative 3. The existing economic conditions (baseline) are discussed in Section I of this Appendix. Alternative 3 would likely lead to an increase in expenditures in the marine boating industry as compared with baseline conditions, which would result in a number of secondary effects on the Florida economy. First, an increase in marine access points in the Atlantic Stock would likely result in an increase in recreational boating activity.⁴⁰ This increase in boating activity would likely to lead to increased demand for marine retail sales, such as boats, clothing, general marine merchandise and other related goods and services. Second, lifting restrictions on the authorization and construction of such facilities as boat docks, marinas, and boat ramps would likely result in additional demand for marine construction services. Increased expenditures in these industries would also result in secondary effects on related sectors of the Florida economy. Some of these related sectors may be closely associated with the marine industry, such as fishing accessories and sporting goods industries. However, some sectors may be less closely associated with the marine industry, such as the radio and communications equipment and banking industries. For example, an increase in boat sales may lead to an increase in banking industry revenue due to the increase in boat-related loans issued.

The marine industry is a substantial contributor to Florida's economy (Exhibit M-36). As a way to approximate the contribution of the marine industry to the Florida economy, we looked at revenue information collected by the Florida State Department of Revenue for two industry sectors. Boat dealers and motor boat and yacht dealers in the four stocks generate approximately \$4.79 billion in annual revenue. In addition, parking lots and boat docking establishments generate approximately \$702 million in annual revenue.⁴¹ The majority of the marine industry is located in the Atlantic

⁴⁰Existing literature indicates that marine access and boating activity are positively correlated; for example, see Siderelis, *et al.* (1995).

⁴¹ These figures are based on data provided by the Florida Department of Revenue. The Florida Department of Revenue classified retail gross sales by dividing them into "like industries" or industry "Kind Codes." Kind Code 28, "Motorboats and Yacht Dealers," includes

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Stock, where there are \$2.92 billion in annual expenditures on motor boat and yacht dealers and \$413 million in annual expenditures at parking lots and boat docking establishments.

EXHIBIT M-36 Gross Sales of Selected Sectors of Florida Marine Industry (millions of 2002 dollars)		
Stock	Motorboat and Yacht Dealers (Kind Code 28)⁴²	Parking Lots, Boat Docking, and Storage (Kind Code 83)⁴³
NW	\$339	\$45
USJ	\$78	\$89
Atlantic	\$2,919	\$413
Southwest	\$1,455	\$155
Four Stock Total	\$4,791	\$702
^a Totals may not add due to rounding. Source: Florida Department of Revenue 2002.		

Without specific marine industry revenue data, we estimate initial direct economic impacts based on expected changes to recreational boating and marine construction. The analysis relies on regional economic modeling to estimate secondary effects. In particular, it utilizes a software package called IMPLAN to estimate the total economic effects of the increase in economic activity in the marine industry associated with this proposed rule. IMPLAN is commonly used by State and Federal agencies for policy planning and evaluation purposes. The model draws upon data from several Federal and State agencies, including the Bureau of Economic Analysis and the Bureau of Labor Statistics.

IMPLAN translates initial changes in expenditure that are entered into the model into changes in demand for output from affected industries and corresponding changes in demand for inputs to those industries and so on. These effects can be described as *direct*, *indirect*, or *induced*, depending upon the nature of the change.

the retail sales of motorboats, yachts, and accessories, while Kind Code 83, “Parking Lots, Boat Docking, and Storage,” includes boat docking and storage, parking lots, and parking structures. Note that Kind Code 83 includes several nonmarine sectors. Thus, it will over-represent marine-related expenditures.

⁴²This industry sector consists of motorboat, yacht, marine parts, accessories, and boat dealers.

⁴³ This industry sector includes boat docking and storage, parking lots, and parking structures. Note that this sector includes several nonmarine sectors. Thus, it will overrepresent marine-related expenditures.

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- *Direct effects* represent changes in output attributable to a change in demand or a supply shock. These are specified initially by the modeler.
- *Indirect effects* are changes in output of industries linked to those that are directly affected by the initial change in expenditures.
- *Induced effects* reflect changes in household consumption arising from changes in employment (which in turn are the result of direct and indirect effects). For example, changes in employment in a region may affect the consumption of certain goods and services.

These categories are calculated for all industries and aggregated to determine the regional economic impact of the proposed regulation.

There are two important caveats relevant to the interpretation of IMPLAN model estimates, generally, and within the context of this analysis. The first is that the model is static in nature and measures only those effects resulting from a specific policy change (or the functional equivalent specified by the modeler) at one point in time. Thus, IMPLAN does not account for posterior adjustments that may occur, such as the subsequent reemployment of workers displaced by the original policy change. In our application, this caveat suggests that the long-run net output and employment effects resulting from changes in boating and permitting regulations are likely to be smaller than those estimated in the model, which will lead to an upward bias in our estimates. A second caveat to the IMPLAN analyses is related to the model data. Our IMPLAN analysis relies upon input/output relationships derived from 1998 data. Thus, in our analyses we assume that this characterization of the Florida economy is a reasonable approximation of current conditions. If significant changes have occurred in the structure of Florida's economy, our results may be sensitive to this assumption. However, the magnitude and direction of any such bias are unknown.

Impacts of Increased Demand for Marine Goods and Services

An increase in permit approvals for multi-slip marine access facilities would have a regional economic impact on the Atlantic Stock. We assume that some individuals, who previously were unable to obtain access at marina slips or boat ramps, would choose to participate in boating activities, resulting in an increase of recreational boating trips taken in the Atlantic Stock. First, we estimate the regional economic impact associated with increased boat trips from individuals who are able to obtain marina slips; then we estimate the regional economic impact associated with additional boat trips from individuals who are able to find an uncongested boat ramp. We find that the positive regional economic impact of an increase in marina user and boat ramp user boating trips in the Atlantic Stock would range from approximately \$0.7 to \$16.7 million (Exhibits M-40 and M-43). This positive regional economic impact would reduce negative baseline impacts by 15 to 35 percent in year five of the rule. Year five estimates are chosen to illustrate these annual regional economic impacts because of the cumulative nature of these impacts.

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Marina Slip Users

- As described in the “Surplus Impacts to Marina Users” section, we assume that the additional five -year marina slips permitted corresponds to an accumulated number of additional boaters who take boating trips. That is, approximately 112 additional boaters choose to participate in boating in year five (Exhibit M-37).
- As noted earlier, we estimate that, on average, boaters in Florida take approximately 60 boating trips per year. Four Florida county-level studies indicate the average number of boating days for boat ramp users and private marina users to range from 54 to 76 days per year (GEC 1999; GEC 2001a; GEC 2001b; GEC 2001c).
- We apply this average to the number of boaters affected, and we estimate that nearly 6,720 additional trips will be taken in Florida in year five of the analysis (Exhibit M-37).

EXHIBIT M-37 Estimate of the Increased Number of Boat Trips Originating From Marina Slips in Year Five of the Analysis			
Stock	Additional Year Five Marina Slip Demand	Average Number of Boating Trips per Year per Boater	Total Trips Added in Year Five
NW	0	60 days per year	0
USJ	0		0
Atlantic	112		6,720
Southwest	0		0
Four Stock Total	112		6,720

- We use a recent Department of Commerce Report that focuses on the Southeastern US to estimate the average expenditures on each lost boat trip (Gentner *et al.* 2002). This report calculates marine angler trip expenditures for eastern Florida and western Florida in 1999. Focusing only on those expenditures appropriate for boating activities (*i.e.*, excluding bait and ice expenditures), we find eastern Florida expenditures to be approximately \$62 per trip and western Florida expenditures to be approximately \$48 per trip (2001 dollars). We use the eastern Florida per trip expenditures to represent expenditures in the Atlantic and USJ Stocks, and we use the western Florida per trip expenditures to represent expenditures in the NW and Southwest Stocks (Exhibit M-38).

EXHIBIT M-38 Average Expenditures per Boat Trip (2001 dollars)		
	Eastern Florida (Atlantic/USJ)	Western Florida (NW/Southwest)
Transportation	\$4.15	\$2.58
Food	\$15.07	\$12.26
Lodging	\$25.00	\$18.94
Fuel	\$16.83	\$13.50
Access/Boat Launch/Rental	\$1.00	\$0.99
Total ^a	\$62.05	\$48.27
^a Totals may not add due to rounding.		

- We calculate the total increase in expenditures in each industry in year five of the analysis due to the increase in boat trips. We do this by multiplying the average per-trip expenditures in each stock by the number of added trips taken each year (Exhibit M-39).

EXHIBIT M-39 Total Additional Boat Trip Expenditures from Trips Originating at Marina Slips (thousands of 2001 dollars)	
	Expenditures
Transportation	\$30
Food	\$100
Lodging	\$170
Fuel	\$110
Access/Boat Launch/Rental	\$10
Total ^a	\$420
^a Total may not add due to rounding	

- We apply this initial change in expenditures to IMPLAN to estimate the regional economic impact of the increase in boating trips.

The positive regional economic impact of an increase in boating trips originating from marina slips in the Atlantic Stock is approximately \$660,000 in year five (Exhibit M-40). This positive regional economic impact would reduce negative baseline impacts by 15 percent. We also use IMPLAN to calculate the change in net employment. This analysis shows that there would be a gain of approximately 11 jobs from the direct, indirect, and induced effects of added boat trips from marina slips in the Atlantic Stock.

EXHIBIT M-40 Economic Impact on the State of Florida of a Increase in Boating Trips Originating From Marina Slips for Year Five of the Analysis (thousands of 2001 dollars)				
Stock	Direct Effect on Expenditures	Indirect Effect on Expenditures	Induced Effect on Expenditures	Total Regional Economic Impact
NW	\$0	\$0	\$0	\$0
USJ	\$0	\$0	\$0	\$0
Atlantic	\$420	\$80	\$160	\$660
Southwest	\$0	\$0	\$0	\$0
Four Stock total	\$420	\$80	\$160	\$660

Boat Ramp Users

To estimate the regional economic impact associated with the additional boat trips from individuals who are able to find an uncongested boat ramp, we use a methodology similar to the estimate of regional economic impact associated with the increase in boat trips from individuals who are able to obtain a marina slip.

- We assume that increased boat ramp demand will be met due to Alternative 3. This corresponds to the added number of boaters who take boating trips originating from boat ramps. That is, at the high end of our estimate range, approximately 1,020 new boaters (12,800 new boat ramp users * 8% additional permit approval rate) would be able to participate in boating due to increased boat ramp capacity in the Atlantic Stock each year.
- We estimate that, on average, boat ramp users in Florida take approximately 32 boating trips per year. Bell (1995) reports several estimates of the average number of boating days per household at boat ramps in Florida. The results range from 24 to 44 days per year, and reflect an average of approximately 32 days per year.
- Under the same assumptions we used to estimate the low- and high-end number of lost boating days for the boat ramp users surplus benefits, we estimate that approximately 0 to 164,000 boating trips from boat ramps would not be taken in year five of the analysis (Exhibit M-41).

EXHIBIT M-41 Estimated Annual Increase in Boat Ramp Days					
Stock	Average Number of Boating Trips per Year	Annual Number of New Boat Ramp Users	Additional Permit Approval Rate	Increase in Number of Boat Ramp Trips in Year Five Low End	Increase in Number of Boat Ramp Trips in Year Five High End
NW	32	5,200	0%	0	0
USJ		2,100	0%	0	0
Atlantic		12,800	8%	0	164,000
Southwest		11,200	0%	0	0
Four Stock Total^a		31,200	-	0	164,000
^a Totals may not add due to rounding.					

- Under the same assumptions we used to estimate expenditures for marina slip users, we estimate USJ and Atlantic stock boating expenditures to be approximately \$62 per trip and NW and Southwest boating expenditures to be approximately \$48 per trip (Exhibit M-38).
- We calculate the total increase in expenditures in each industry in year five of the analysis due to the increase in boat trips by multiplying the average per-trip expenditures in each stock by the number of added trips taken each year (Exhibit M-42).

EXHIBIT M-42 Total Increase of Boat Trip Expenditures from Trips Originating at Boat Ramps (millions of 2001 dollars)	
Expense Category	Expenditures (Low/High)
Transportation	\$0 / \$0.7
Food	\$0 / \$2.5
Lodging	\$0 / \$4.1
Fuel	\$0 / \$2.8
Access/Boat Launch/Rental	\$0 / \$0.2
Total	\$0 / \$10.2

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- We apply this initial change in expenditures to IMPLAN to estimate the regional economic impact of the increase in boating trips.

The estimated positive regional economic impact of an increase in boating trips originating from boat ramps under Alternative 3 would be between \$0 and \$16 million in year five (Exhibit M-43). This regional economic impact would reduce negative regional economic impacts in the baseline by up to 37 percent. We also use IMPLAN to calculate the change in net employment. This analysis shows that there would be a gain of between zero and 261 jobs from the direct, indirect, and induced effects of added boat trips from boat ramps in the Atlantic Stock.

EXHIBIT M-43 Economic Impact of an Increase in Boating Trips Originating from Boat Ramps for Year Five of the Analysis (millions of 2001 dollars)				
Stock	Direct Effect on Expenditures (Low/High)	Indirect Effect on Expenditures (Low/High)	Induced Effect on Expenditures (Low/High)	Total Regional Economic Impact (Low/High)
NW	\$0 / \$0	\$0 / \$0	\$0 / \$0	\$0 / \$0
USJ	\$0 / \$0	\$0 / \$0	\$0 / \$0	\$0 / \$0
Atlantic	\$0 / \$10.2	\$0 / \$2.0	\$0 / \$3.8	\$0 / \$16.0
Southwest	\$0 / \$0	\$0 / \$0	\$0 / \$0	\$0 / \$0
Four Stock total	\$0 / \$10.2	\$0 / \$2.0	\$0 / \$3.8	\$0 / \$16.0

In total, positive regional economic impacts from increased demand for marine goods and services from additional marina slip and boat ramp users would be between \$0.7 and \$16.7 million in year five. This regional economic impact would reduce negative regional economic impacts in the baseline by 15 to 35 percent.

Impacts of Increased Demand for Marine Construction

Under Alternative 3, we assume that marina slip and boat ramp construction would no longer be restricted in the Atlantic Stock during the five-year period of the rule. As a result, the Service would likely recommend approval of an additional eight percent of multi-slip watercraft access facility related permits in the Atlantic Stock, resulting in an increase in marine construction expenditures.

To estimate the impact on the economy from an increase in the demand for marine construction, we require information on marine construction revenue. Unfortunately, marine construction revenue is not readily available by county. Moreover, the Statewide construction revenue data (NAICS Code 23499, 1997 United States Economic Census), which contains information on docks and other marine construction activity, also includes less relevant data on a wide variety of non-marine related heavy construction activity. As a result, these data overrepresent marine construction activity.

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Therefore, we gathered data from a variety of sources to estimate revenue associated with marina slip and boat ramp construction.

- First, we gathered data on the cost of building a marina slip or a boat ramp. To do this, we spoke with marine construction companies in Florida.⁴⁴ The revenue ranges reflect a variety of factors that influence construction costs (2001 dollars). Because the majority of construction projects fall in the middle of these ranges, we select the midpoint to calculate additional revenue.
 - **Marina Slip: \$4,000 - \$6,000.** Based on our research and on an average size slip of approximately 150 square feet, we estimate the per slip cost to range from \$4,000 to \$6,000.⁴⁵ The costs vary, depending on the size of the slip, type and extent of amenities, and material used for construction, and economies of scale inherent in building large marinas.
 - **Boat Ramp: \$20,000 - \$25,000.** To estimate the cost of boat ramp construction, we contacted marine construction firms and municipalities. Based on this research, we estimate the per lane cost of ramp construction to be between \$20,000 and \$25,000.⁴⁶ The prices for boat ramps are variable and depend on shoreline elevation, length of ramp, required gradient, construction of adjacent parking lot, inclusion of docks for temporary dockage and other grading and sloping of adjoining shoreline.
- Second, we estimate the number of additional marina slips and boat ramps that could be built due to the regulation (Exhibit M-44).
 - **Marina Slips:** As noted in the discussion of “Surplus Benefits to Marina Users” we estimate the number of new marina slips that would be able to be constructed over the five-year period of the rule (Exhibit M-29). We estimate that approximately 1,240 marina slips are permitted annually in the four stocks, and that an additional eight percent of permits in the Atlantic Stock would be recommended for approval, adding approximately 22 marina slips annually (Exhibit M-44).
 - **Boat Ramps:** Bell (1995) estimates the projected demand and supply for boat ramps for Florida’s coastal regions and counties for 1995, 2000, 2005, and 2010. In particular, the study estimates the number of ramp lanes needed over baseline (1992 supply and demand)

⁴⁴ Specifically, we contacted approximately two dozen marine construction firms based in the four stock area and requested estimates for the revenue associated with dock, marine slip, and boat ramp construction.

⁴⁵ Note: the actual size of a slip may vary depending across stocks and marinas. The average size of 150 square feet represents the most common size slip.

⁴⁶ We assume a single lane ramp is 16 feet wide, approximately 65 feet long, and supports an average gradient of 15 percent.

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by county. To estimate the number of additional boat ramps built over the five-year period, we first assume that the 2000 boat ramp demand projected in 1992 was fulfilled. Based on this assumption, we then multiply the annual number of estimated ramp lanes needed over the period 2000 to 2005 by five to estimate the total number of boat ramp lanes demanded over the five-year time frame of the analysis.⁴⁷ It is further assumed that under Alternative 3, an additional eight percent of these ramps would be able to be built in the Atlantic Stock. That is, Alternative 3 would result in an increase in approximately one boat ramp annually (Exhibit M-44).

EXHIBIT M-44					
Increase in Annual Marine Construction Demand					
Stock	Annual Marina Slip Demand	Annual Boat Ramp Demand	Additional Permit Approval Rate	Added Annual Marina Slip Demand	Added Annual Boat Ramp Demand
NW	90	3	0 %	0	0
USJ	60	0	0 %	0	0
Atlantic	280	15	8 %	22	1
Southwest	810	9	0 %	0	0
Four Stock total	1,240	27	-	22	1

- Applying the cost of building a marina slip or boat ramp to the projected increased demand for construction of these marine access facilities, we estimate the total revenue likely to be gained by the marine construction industry due to Alternative 3. For the Atlantic stock, we estimate this impact would be approximately \$139,000 annually (Exhibit M-45).

⁴⁷ The annual number of estimated ramp lanes needed over the period 2000 to 2005 is based on the scenario that each boating party uses a boat ramp for 30 minutes per day. Note that the 30-minute use assumption represents the study's mid-point estimate of the total time required to launch and retrieve recreational watercraft, including some waiting time (*i.e.*, it assumes that access is not instantaneous). Under this assumption, during a 12-hour day, an average of 36 boats could use a single-lane ramp.

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EXHIBIT M-45 Marine Construction Annual Revenue Gain (thousands of 2001 dollars)			
Stock	Marina Slip Revenue	Boat Ramp Revenue	Total^a
NW	\$0	\$0	\$0
USJ	\$0	\$0	\$0
Atlantic	\$112	\$27	\$139
Southwest	\$0	\$0	\$0
Four Stock Total^a	\$112	\$27	\$139
^a Totals may not add due to rounding			

Under Alternative 3, we estimate that there would be an increase in direct economic activity in the marine construction sector of approximately \$139,000 (Exhibit M-45). This change in expenditures would ripple through the economy, leading to a number of indirect and induced effects (Exhibit M-46). We estimate that the revenue gains of industries indirectly linked to marine construction would likely to lead to an increase of approximately \$56,000 in expenditures. In addition, we estimate that the changes in direct and indirect expenditures would lead to a gain of approximately \$56,000 in household consumption (induced effects). Thus, the total positive regional economic impact of increased marine construction under Alternative 3 would be approximately \$252,000. The annual impact for this category is expected to be constant over the five year period of the rule, thus annual impacts also represent year-five impacts. This positive regional economic impact would reduce negative regional economic impacts in the baseline by 14 percent annually. We also use IMPLAN to calculate the change in net employment. This analysis shows that there would be a gain of approximately two jobs from the direct, indirect, and induced effects of added marine construction in the study area.

EXHIBIT M-46 Annual Regional Economic Impact of an Increase in Marine Construction Expenditures (thousands of 2001 dollars)				
Stock	Direct Effect on Expenditures	Indirect Effect on Expenditures	Induced Effect on Expenditures	Total Regional Economic Impact
NW	\$0	\$0	\$0	\$0
USJ	\$0	\$0	\$0	\$0
Atlantic	\$139	\$56	\$56	\$252
Southwest	\$0	\$0	\$0	\$0
Four Stock total	\$139	\$56	\$56	\$252
^a Totals may not add due to rounding				

Regional Economic Impact Summary

Thus, Alternative 3 would lead to a positive regional economic impact of between \$0.7 million and \$16.7 million due to an increase in the revenues of the marine recreation industry and \$0.3 million due to an increase in the revenue of the marine construction industry, for a total positive regional economic impact of between \$0.9 million and \$16.9 million in year five of the rule.⁴⁸ Overall, the positive regional economic impact expected under Alternative 3 would reduce negative baseline regional impacts by 15 to 34 percent in year five.

Additional breakdown of the incremental economic impacts under this alternative is provided in Appendix L, which provides a year-by-year summary of nominal impacts by category and stock for the five-year period of the rule.

⁴⁸Regional economic impact estimates are independent from surplus estimates and cannot be added to obtain a single value.